ESSENTIALS OF ARITHMETIC

PRIMARY BOOK

WENTWORTH-SMITH

ESSENTIALS OF ARITHMETIC

PRIMARY BOOK

BY

GEORGE WENTWORTH

AND

DAVID EUGENE SMITH

37564

PREFACE

This book is the first of a series of three intended to cover the essentials of arithmetic in the eight school years of the elementary course. It consists of five chapters, the first of which reviews the work usually done in the first and second grades, the others covering the work of the successive half grades through the fourth school year. If it is introduced in Grade II, the pupils should complete Chapter I in that year; but if it is first placed in the hands of the class in Grade III, it will suffice to take a rapid review of Chapter I, omitting such portions as may already be perfectly familiar to the children.

A textbook for these grades can be constructed on any one of several definite plans, or, indeed, with little attention to any systematic arrangement whatever. It may consist of a series of devices for teachers, such as games and dramatizations, all valuable in themselves but not offering the material needed in a usable textbook. To be usable a book should suggest devices of this kind, which with many others the teachers may bring into their work, but it fails of its purpose if it uses most of its limited space in this manner. The primary purpose of a textbook in arithmetic is to furnish a large amount of material which the teachers would otherwise have to dictate, and to arrange this material in a systematic order. Teachers need hundreds of examples in addition, hundreds of examples in subtraction, and so on, and they should not be required to make up, arrange, and dictate this material. Teachers always welcome suggestions of games, of dramatizations of number relations, and of means to apply number facts to the daily experiences of the child, but such devices of teaching must necessarily come in large part from the teachers themselves.

This book stands, in the first place, for good, well-arranged mathe-
matics, and not for the scrappy presentation which always fails to
give to the pupil that feeling of mastery of the subject·to which he
is entitled ; and in the second place it appeals to the pupil's human
interests by relating the subject to his personal needs and to the
life in which he finds himself. It seeks to balance reasonably these
two features, refraining on the one hand from devoting all its space
to abstract drill, and on the other hand from failing, through the
sacrifice of its space to methods of teaching, to give the amount of
drill that is necessary. It recognizes that the children who study
its pages have already been in school from one to two years, that
they not only possess a fair knowledge of number but that motives
for study have already begun to be formed, and that the kindergarten
stage is already passing out of their lives. Devices that are needed
in Grade I are not necessary in Grade III; and the teachers, to a
large extent, must be the judges as to how long they shall keep to
the concrete introduction to the work, and as to the use they shall
make of the numerous devices suggested in the book.

It is the hope of the authors that teachers will find that the series
furnishes exactly the essentials for good arithmetic work in the
elementary schools and presents these essentials in the most usable
manner.

<div style="text-align: right">

GEORGE WENTWORTH
DAVID EUGENE SMITH

</div>

CONTENTS

CHAPTER I

CHAPTER II

CHAPTER III

ESSENTIALS OF ARITHMETIC

PRIMARY BOOK

CHAPTER I

I. COUNTING TO TWELVE

What You may have Learned. You have learned to count and to write numbers. Can you count to ten?

Are there twenty children in this room?

Can you tell how many children there are in this room?

Do you know what I mean when I speak of half the children in the room?

Do you know how many cents there are in a dollar and a quarter, or a dollar and a half?

If your father has a dollar and spends seventy-five cents for you, do you know how much he will have left? If you cannot tell now, you will be able to tell after you have studied this book.

This page calls attention to some things that the children know, and to some that they have still to learn. The teacher will find it of advantage to suggest from time to time, in simple problems, the motives which should prompt the pupil to study further. The reading of some of the problems a few pages in advance is often a good stimulus for work.

Notes in this type throughout the book are intended for the teacher.

ORAL EXERCISE

1. Here are some children playing with their pet donkey. How many children do you see?

2. How many children are riding on the donkey?

3. How many girls are riding on the donkey?

4. How many boys are riding on the donkey?

5. How many children are on the ground?

6. If the little girl without a hat should get off, how many children would be left on the donkey? How many girls would be left on the donkey?

7. If both little girls should get off, how many children would be left on the donkey?

Teachers should always be sure that new words do not obscure the meaning. Since this book is not intended for Grade I, the above words are probably all known, otherwise they should be explained.

1. Let us play store. How many are there to play?

2. How many clerks shall we have in the store?

3. How much shall we charge for apples?

4. How many apples do you wish to buy?

5. How much shall we charge for oranges?

6. How many oranges do you wish to buy?

7. How many bottles of milk are ⌂ ⌂ and ⌂ ⌂ ⌂?

8. Jack sells some blocks for building playhouses. How many blocks are ▢ ▢ ▢ and ▢ ▢?

9. Rob sells some dolls. He sells 5 dolls to Mary and 1 doll to Kate. How many dolls does he sell?

10. Kate buys some cups for the doll's table. How many cups are ♋ ♋ ♋ and ♋ ♋?

11. Kate buys an orange for 3 cents. She gives 5 cents. How much change does she get?

This shows what is called the dramatization of arithmetic — acting out a real situation. Such work is more real when planned and suggested by the teacher than when it is given in a textbook. On this account only a limited amount of space can profitably be given to the subject in a book of this kind. Frequent suggestions are made, however.

Among the common rhymes that can be dramatized at this time are the following: Bo-peep, Going to St. Ives, Old Mother Hubbard, Ten Little Indians, Three Little Kittens, and the Old Woman who lived in a Shoe. Among the common stories are Jack and the Beanstalk, the Three Bears, and Jack the Giant Killer. Among the dramatized occupations are running a grocery store, building a snow fort, hunting eggs, picking or selling fruit, sewing, being a trolley-car conductor, and fishing.

1. Write in figures the numbers from 1 to 5.

2. Write in figures the numbers from 5 to 10, and then from 10 back to 5.

3. Write in figures the numbers from 7 to 12, and then from 12 back to 7.

4. Write in figures the numbers from 9 back to 2, and then up from 2 to 9.

5. Write in figures the numbers from 12 back to 1, and then up from 1 to 12.

6. Write in figures the number of words in this line.

7. Close your eyes and hear me tap the desk. Write in figures the number of taps you heard.

8. Close your eyes and touch the fingers which I hold out. Write in figures the number of fingers you touched.

9. Write in figures the numbers from 0 to 10.

10. Write in figures the numbers from 10 back to 0.

11. Write in figures the number of doors in this room, and then write the number of windows.

12. Write in figures the number of desks in your row.

13. Write in figures the numbers which come just after 3, 9, 5, 7, 1, and 8, in counting from 0 to 12.

14. Write in figures the numbers which come just before 7, 6, 9, 5, 3, and 10, in counting.

15. Write in figures the number which comes between 9 and 11 in counting.

II. ADDITION

ORAL EXERCISE

1. How much do you add to 2 cents to make 3 cents?

2. How many marbles are 2 marbles and 2 marbles?

3. How many boys are 5 boys and 2 boys?

4. How many blocks are 7 blocks and 2 blocks?

Addition. When we add 3 cents and 4 cents we get 7 cents, and 7 cents is called the *sum* of 3 cents and 4 cents.

We write the numbers to be added, one above the other, with a bar below the lower one, and the sum below the bar.

$$\begin{array}{c} 3 \\ 4 \\ \hline 7 \end{array}$$

The sum of 3 and 4 is also written $3 + 4 = 7$.

The sign $+$ means *and*. This sign is also called *plus*. The sign $=$ means *equals*.

State rapidly these sums:

5. 2	4	8	6	9	1	5	7	3	10
1	1	1	1	1	1	1	1	1	1

6. 5	3	8	1	6	4	9	2	7	10
2	2	2	2	2	2	2	2	2	2

The teacher will find sets of cards, each having a combination like those in Ex. 5, useful for drill, the set to be enlarged as the class advances.

Less written than oral work should be given at first, and pupils should be required to do the written as well as the oral work quickly. Loitering brings both inaccuracy and lack of interest.

DEVELOPMENT GAME

1. These girls count 2 for each skip of the rope. They count " 2, 4, 6," and so on. Count for four skips.

2. Count 2 for each skip of the rope to five skips.

3. Count 2 for each skip of the rope to six skips.

4. The girls swing the rope faster. Now they count 3 for each skip. Count for three skips.

5. Count 3 for each skip to four skips.

6. Ruth cannot jump very well, but she can add fast. Count 4 for each of her skips for three skips.

7. Count by 2's from 2 to 12.

8. Count by 3's from 3 to 12.

9. Count by 4's from 4 to 12.

10. Count backwards by 2's from 12 to 2.

From time to time a certain amount of dramatized work should be introduced by the teacher, as suggested on page 3, but it should not be so extravagantly used as to leave no time for real number work.

ORAL EXERCISE

State rapidly these sums :

| **1.** | 5 | 3 | 7 | 1 | 4 | 6 | 2 | 9 | 8 | 0 |
| | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

| **2.** | 3 | 1 | 4 | 6 | 2 | 7 | 5 | 8 | 0 | 4 |
| | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 0 | 0 |

| **3.** | 4 | 2 | 1 | 5 | 3 | 7 | 6 | 0 | 4 | 3 |
| | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 1 | 2 |

| **4.** | 1 | 3 | 2 | 5 | 6 | 0 | 4 | 6 | 5 | 4 |
| | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 0 | 1 | 2 |

| **5.** | 2 | 1 | 4 | 3 | 0 | 5 | 2 | 1 | 4 | 3 |
| | 7 | 7 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 |

| **6.** | 0 | 8 | 0 | 2 | 1 | 3 | 9 | 8 | 7 | 7 |
| | 8 | 0 | 9 | 9 | 9 | 9 | 0 | 1 | 1 | 2 |

WRITTEN EXERCISE

Make pictures like this, showing the sums below. Write the answers.

$3 + 4 = 7$

$2 + 5$	$6 + 0$	$4 + 2$	$5 + 3$	$5 + 5$
$6 + 2$	$2 + 8$	$4 + 3$	$8 + 4$	$9 + 2$
$3 + 5$	$0 + 8$	$6 + 5$	$7 + 3$	$7 + 5$

In drill work of this kind, number games may be used with discretion. For example, one of these number combinations may be placed on each step of a ladder drawn on the blackboard, and children may climb rapidly until they fall off by making an error.

ORAL EXERCISE

1. How many children are there in the picture?

2. How many children are 4 children and 3 children?

3. How many children are 5 children and 2 children?

Add these numbers and make problems about them:

4. 6	1	3	6	7	7	1	1	9	9
1	6	6	0	2	1	7	3	1	0

5. 5	2	5	1	5	3	0	0	1	8
2	5	1	5	0	5	9	2	8	0

WRITTEN EXERCISE

Copy and add:

1. $3 + 0$	$5 + 3$	$7 + 2$	$6 + 3$	$5 + 4$
2. $0 + 3$	$3 + 5$	$2 + 7$	$3 + 6$	$6 + 0$
3. $4 + 0$	$4 + 6$	$8 + 1$	$4 + 1$	$8 + 2$

DRILL GAMES

1. Our class played the game of Numbers on the Hoop. The teacher put this picture on the blackboard. As Ruth pointed to the numbers on the hoop, we added 5 to each. Add 5 to each of these numbers:

1	3	2	7	0	6	5	4
7	0	6	4	2	5	3	1

Change the number to be added and write the new number in the hoop, making a new game. The numbers must be chosen so that the sum, at this time, does not exceed 12. Similarly for Ex. 2 and other games.

2. We played Running the Square. The teacher put this picture on the blackboard. As John pointed to the numbers at the corners and on the sides, we ran around the square with him and added 2 to each number. Add 2 to each of these numbers:

7	3	6	9	5	2	4	8
1	4	2	6	8	3	7	5
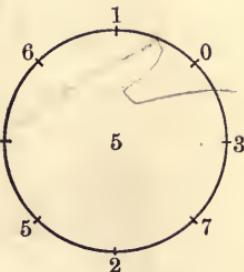
3. We also played Running the Triangle. The teacher put this picture on the blackboard, and we tried to see how fast we could run, adding each number to the one inside. Run around, beginning with 4. Run around, beginning with 9. Run around, beginning with 5. Run around, beginning with 6. Run around, beginning with 8.
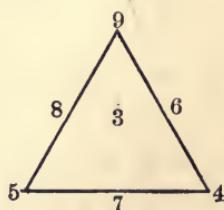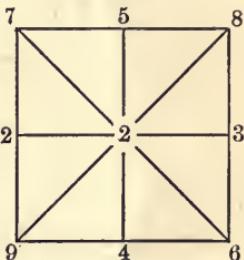
III. ADDITION AND SUBTRACTION

ORAL EXERCISE

1. There are 6 children in a row. How many children must be added to this number to make 11?

2. Jennie wishes to buy a 5-cent paper. She has 2 cents in her pocket. How many more cents must she have?

3. Jack has 8 marbles. How many more marbles must he get so as to have 11 marbles in all?

4. After we have studied 6 pages of this book, how many more must we study to make 10 pages in all?

5. What number must we add to 6 to make 9? to 3 to make 7? to 7 to make 10? to 10 to make 12?

6. What numbers must I put in place of the stars to have these additions all right?

2	3	6	5	7	3	3	9
*	*	*	*	*	*	*	*
5	7	7	9	11	3	4	12

7. Answer these questions:

> 5 and what number are 7?
> 7 and what number are 12?
> 6 and what number are 11?

8. Name the numbers to put in place of these stars:

5 + * = 10	4 + * = 6	* + 6 = 12
7 + * = 12	6 + * = 9	6 + * = 12
9 + * = 11	* + 4 = 6	7 + * = 11

ORAL EXERCISE

1. Helen is counting her blocks. She has 7 blocks and takes away 3 blocks. How many blocks are left?

2. If Helen takes 4 blocks from 7 blocks, how many blocks are left?

3. How many blocks are 7 of these blocks less 3 of these blocks?

4. How many blocks are 7 of these blocks less 4 of these blocks?

5. If Helen has 7 cents and spends 4 cents, how many cents has she left?

Subtraction. Taking 3 blocks from 7 blocks is called *subtraction.* We *subtract* 3 blocks from 7 blocks.

To show that we subtract 3 from 7 we write the work in a column as shown below in the margin. We may also show it by writing the numbers like this:

$$7 - 3 = 4,$$

which we read in any one of these three ways:

$$\begin{array}{r} 7 \\ -3 \\ \hline 4 \end{array}$$

        7 less 3 is 4,

        7 minus 3 equals 4,

or   3 from 7 is 4.

The pupil is now old enough to understand all these expressions, and he should use them interchangeably. The relation of $3 + 4 = 7$ to $7 - 4 = 3$ and $7 - 3 = 4$ should be understood by the pupil.

EP

ORAL EXERCISE

1. Jennie is buying apples from Kate. If she buys 2 cents' worth, and gives Kate 10 cents, how much change should she get?

2. If she buys 5 cents' worth of candy, how much change should she get if she gives Kate 10 cents?

3. How much money should she pay Kate for 2 pop-corn balls if they cost 2 cents each? What change should she get if she gives Kate a 5-cent piece.

4. If Jennie buys 3 apples, paying 1 cent for each, and a pop-corn ball for 2 cents, how much does she pay for all?

5. If Jennie buys 2 apples at 1 cent each, and 5 cents' worth of candy, and 4 cents' worth of pop-corn balls, how much does she pay for all?

WRITTEN EXERCISE

Copy and subtract:

1. 6   8   6   7   3   4   5
        4   5   2   1   1   2   3
       ---   ---   ---   ---   ---   ---   ---

2. 9   6   6   8   11   12   12
        7   0   1   3   9   3   2
       ---   ---   ---   ---   ---   ---   ---

DEVELOPMENT GAME

1. In school to-day we played the game of Climbing the Ladder. We climbed as fast as we could. When any one made a mistake he fell off. Climb the ladder in the picture. These numbers are $5 - 2$, $4 - 2$, $3 - 2$, $8 - 2$, $9 - 2$, $7 - 2$, and $6 - 2$. Tell the answers as fast as you can.

2. Tell the answers for $9 - 2$, $7 - 2$, $5 - 2$.

Climb these ladders as fast as you can, beginning at the foot:

3.	4.	5.	6.
$12 - 3$	$12 - 4$	$10 - 5$	$11 - 6$
$10 - 3$	$10 - 4$	$12 - 5$	$10 - 6$
$5 - 3$	$11 - 4$	$11 - 5$	$12 - 6$
$3 - 3$	$7 - 4$	$7 - 5$	$7 - 6$
$8 - 3$	$5 - 4$	$5 - 5$	$6 - 6$
$4 - 3$	$9 - 4$	$9 - 5$	$8 - 6$
$9 - 3$	$6 - 4$	$8 - 5$	$9 - 6$

Subtract rapidly :

1.	4	6	3	8	3	7	9	9	8	10
	3	2	3	2	1	3	3	0	3	3

2.	2	5	7	5	6	8	7	6	9	11
	2	1	2	3	3	5	0	1	8	10

Copy and subtract :

1.	4	5	6	7	8	9	10	11	12	12
	4	4	4	4	4	4	4	4	4	0

2.	5	6	7	8	9	10	11	12	12	11
	5	5	5	5	5	5	5	5	1	2

3.	6	7	8	9	10	11	12 ·	12	12	10
	6	6	6	6	6	6	6	3	2	0

4.	7	8	9	10	11	12	11	11	11	12
	7	7	7	7	7	7	0	1	11	12

5. If you have 10 cents and spend 4 cents, how many cents will be left?

6. If you have 12 apples and eat 2 of them, how many apples will be left?

7. If you have 7 roses and give away 5 of them, how many will you have left?

8. If 8 girls stand, and then 2 of them sit down, how many are left standing?

IV. COUNTING TO 100

ORAL EXERCISE

1. How many books are there in the picture? If there were 10 more, how many would there be? What name do we give to two 10's?

2. How many blocks in the black and white pile? How many 10's in this pile?
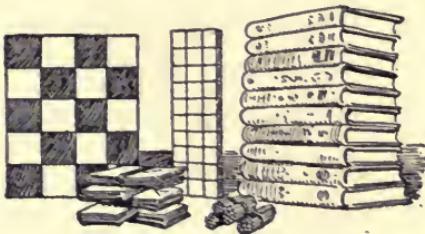
3. There are 3 columns of smaller blocks. How many blocks in each column? How many in all? What name do we give to 3 tens?

4. There are 4 bundles of splints in the picture, 10 in each bundle. How many splints in all? What name do we give to 4 tens?

5. There are 5 packages of envelopes, 10 in each package. How many envelopes are there? What name do we give to 5 tens?

6. Read these numbers:

10	20	30	40	50
60	70	80	90	100

7. How many tens are there in 20? in 30? in 70? in 40? in 50? in 90? in 100?

8. What name do we give to 9 tens? to 6 tens? to 8 tens? to 7 tens? to 10 tens?

9. Tell how to write seventy on the blackboard.

ORAL EXERCISE

1. If you call 2 tens *twenty* and write it 20, and if you call 3 tens *thirty* and write it 30, what should you call 4 tens, and how should you write it? Tell the same for 5 tens, and so on up to 10 tens.

2. If *ty* in *sixty* means *tens*, then *sixty* means *six tens*. Then what does *seventy* mean? What does *eighty* mean?

3. State rapidly the sums:

2	2 tens	20	30	40	30	40
3	3 tens	30	40	50	60	20

United States Money. The table of United States money is as follows:

$$5 \text{ cents} = 1 \text{ nickel}$$
$$10 \text{ cents} = 1 \text{ dime}$$
$$100 \text{ cents} = 1 \text{ dollar}$$

We write ¢ for cents, and $ for dollars, thus:

25¢ means 25 cents,

and　　　　　　$10 means ten dollars.

4. Subtract rapidly:

5	5 tens	50	70	90	90	60
2	2 tens	20	30	40	30	40

5. Read these numbers:

10	90	70	20	50	$10	40¢
60	80	30	40	100	$30	70¢

1. Count from 1 to 10 ; then count by tens from 10 to 100.
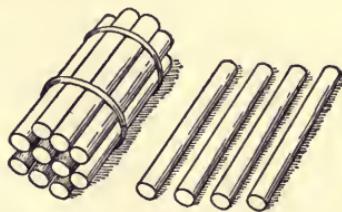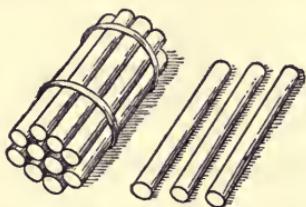
2. How many splints are 10 splints and 1 splint ?

3. How many splints are 10 splints and 2 splints ?

The number after *twelve* is *thirteen.* It is written 13, which means 1 ten and 3 ones.

The number after *thirteen* is *fourteen.* It is written 14, which means 1 ten and 4 ones.

---

4. If *fifteen* means *five and ten,* what does *sixteen* mean ?

5. Read these numbers and tell what each means :

  10   14   15   16   30   18   19

6. Read these numbers and tell what each means :

  17   12   10   40   20   13   11

7. How many pupils' desks are there in your row of desks ?

8. How many pupils are there in your row to-day ?

9. How many words are there in Exs. 7 and 8 together ?

10. How many boys are there in your class ?

ORAL EXERCISE

1. Point to 10 splints and 3 splints in the picture. How much is 10 + 3? Write the number on the blackboard.
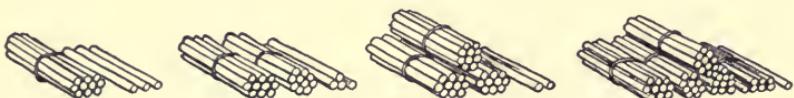
2. In each group, how many packages of 10 splints each, and how many splints over? Write the numbers.

3. Read the following:

Twenty means 2 tens.   Forty means 4 tens.

4. Read the following:

21 means 20 and 1.   34 means 30 and 4.

Read these numbers :

5. 21	62	53	84	65	86	77
6. 31	82	73	.64	75	96	68

7. What number comes after 26 in counting?

8. What number comes before 35?

9. What number comes between 47 and 49?

10. Count from 20 to 30, and then from 30 back to 20.

11. Count from 20 to 40, and then from 40 back to 20.

12. Count from 1 to 50.

13. See if you can count from 1 to 100, speaking the words very clearly, in one minute. Maybe you can do it in less than one minute.

14. Count backwards from 100 to 90.

1. What grade do children enter after the first grade in school? What grade do they next enter?

2. If the first day of the week is Sunday, what is the second day of the week?

3. Which is the sixth day of the week?

4. What day of the month is to-day?

5. To-morrow will be what day of the month?

6. Yesterday was what day of the month?

7. Day after to-morrow will be what day of the month?

8. Which is the first month of the year?

9. In which month does Christmas come? What is the number of that month?

10. What is the number of this page that you are studying? Then which page of the book is it?

11. Which example on this page comes between the seventh example and the ninth example?

1. Write the numbers from 1 to 10.

2. Write the names of these numbers:

   7   9   8   2   4   1   6   5

3. Write in figures:

  Seven   Three   Four   Nine   Eight

4. Write in figures the first number after 5 and the second number before 6.

V. ADDITION

ORAL EXERCISE

1. If you have 9¢ and earn 4¢ more, how many cents do you then have?

2. I think of two numbers whose sum is 13. Can you guess the numbers? There are several correct guesses.

3. Tell what numbers to put in place of these stars:

9	*	8	5	7	6	*	8	*
4	9	5	*	6	*	7	*	*
*	13	*	13	*	13	13	13	13

4. If Carl is 8 years old and his brother is 6 years older, how old is his brother?

5. Tell what numbers to put in place of these stars:

9	8	7	10	7	*	3	8	*
5	6	7	4	*	5	*	*	*
*	*	*	*	14	14	14	14	14

WRITTEN EXERCISE

Copy, add, and make a problem about each:

1. 4	8	9	7	10	7	9	6	12
9	5	4	6	3	7	5	8	2

2. 5	6	5	8	11	11	10	12	10
8	7	9	6	2	3	5	1	4

On this page the work centers about thirteen and fourteen as sums. The pupil is already familiar with sums to twelve.

ORAL EXERCISE

1. If Frank earned 9¢ on Monday and 6¢ on Tuesday, how much did he earn in the two days?

2. If you found 7 eggs in the nests to-day and 8 eggs yesterday, how many have you found in the two days?

3. Tell what numbers to put in place of these stars:

9	8	*	8	*	6	*	7	*
6	7	6	*	7	*	5	*	4
*	*	15	15	15	15	15	15	15

4. Will is 7 years old and his sister is 9 years older. How old is his sister?

5. John has 8¢ and he earns 8¢ more. How many cents has he then?

6. Tell what numbers to put in place of these stars:

9	8	*	*	10	5	12	*	*
7	8	9	8	6	*	4	3	2
*	*	16	16	*	16	*	16	16

WRITTEN EXERCISE

Copy, add, and make a problem about each:

1. 6	7	7	9	10	11	13	14	15
9	8	9	6	5	4	2	2	1

2. 8	9	8	11	12	10	12	14	13
8	7	7	5	4	6	3	1	3

On this page the work centers about fifteen and sixteen as sums.

ORAL EXERCISE

1. If there are 9 girls and 8 boys in a class, how many pupils are there in all?

2. If Kate's score at bean-bag is 8 and Mollie's is 9, what is their total score? What does " total " mean?

3. Tell what numbers to put in place of these stars:

9	8	9	8	12	*	*	15	14
8	9	*	*	5	9	4	*	*
*	*	17	17	*	17	17	17	17

4. Ruth has 9 boys and 9 girls at her party. How many children are there in all?

5. Tell what numbers must be put in place of these stars, and make a problem about each example:

$$11 + * = 17 \qquad * + 15 = 17 \qquad 8 + * = 18$$

WRITTEN EXERCISE

Copy, and add the following:

1. 14	15	12	17	2	10	1	8	2
3	3	5	1	16	7	16	10	16

2. 4	16	16	7	10	11	7	5	13
13	1	2	11	8	6	10	13	4

On this page the work centers about seventeen and eighteen. The pupils have now learned all the combinations of two numbers whose sums are eighteen or less. On the next page this work is given in the form of tables, and the addition drill should be accompanied by subtraction drill. Drill also on adding and subtracting zero and one.

TABLE 23

ADDITION TABLE

$1 + 2 = 3$	$1 + 3 = 4$	$1 + 4 = 5$	$1 + 5 = 6$
$2 + 2 = 4$	$2 + 3 = 5$	$2 + 4 = 6$	$2 + 5 = 7$
$3 + 2 = 5$	$3 + 3 = 6$	$3 + 4 = 7$	$3 + 5 = 8$
$4 + 2 = 6$	$4 + 3 = 7$	$4 + 4 = 8$	$4 + 5 = 9$
$5 + 2 = 7$	$5 + 3 = 8$	$5 + 4 = 9$	$5 + 5 = 10$
$6 + 2 = 8$	$6 + 3 = 9$	$6 + 4 = 10$	$6 + 5 = 11$
$7 + 2 = 9$	$7 + 3 = 10$	$7 + 4 = 11$	$7 + 5 = 12$
$8 + 2 = 10$	$8 + 3 = 11$	$8 + 4 = 12$	$8 + 5 = 13$
$9 + 2 = 11$	$9 + 3 = 12$	$9 + 4 = 13$	$9 + 5 = 14$
$10 + 2 = 12$	$10 + 3 = 13$	$10 + 4 = 14$	$10 + 5 = 15$
$1 + 6 = 7$	$1 + 7 = 8$	$1 + 8 = 9$	$1 + 9 = 10$
$2 + 6 = 8$	$2 + 7 = 9$	$2 + 8 = 10$	$2 + 9 = 11$
$3 + 6 = 9$	$3 + 7 = 10$	$3 + 8 = 11$	$3 + 9 = 12$
$4 + 6 = 10$	$4 + 7 = 11$	$4 + 8 = 12$	$4 + 9 = 13$
$5 + 6 = 11$	$5 + 7 = 12$	$5 + 8 = 13$	$5 + 9 = 14$
$6 + 6 = 12$	$6 + 7 = 13$	$6 + 8 = 14$	$6 + 9 = 15$
$7 + 6 = 13$	$7 + 7 = 14$	$7 + 8 = 15$	$7 + 9 = 16$
$8 + 6 = 14$	$8 + 7 = 15$	$8 + 8 = 16$	$8 + 9 = 17$
$9 + 6 = 15$	$9 + 7 = 16$	$9 + 8 = 17$	$9 + 9 = 18$
$10 + 6 = 16$	$10 + 7 = 17$	$10 + 8 = 18$	$10 + 9 = 19$

The pupil is already familiar with these number facts. There is, however, an advantage in reciting a table, as well as in being drilled upon the number combinations selected at random. The latter drill is provided on the next page and in the frequent reviews.

ORAL EXERCISE

Add the following :

1.	9	5	0	4	3	2	0	6	5	**3**
	5	6	2	7	1	5	3	6	7	**3**

2.	8	6	4	7	7	5	5	3	8	2
	6	7	4	7	6	8	9	4	1	0

3.	5	6	7	4	6	1	2	7	2	0
	1	5	0	9	9	2	4	9	3	9

4.	3	8	0	4	9	8	1	3	2	0
	0	9	5	1	9	0	3	5	1	0

5.	5	8	2	9	1	1	0	9	6	3
	0	8	2	6	4	5	6	8	0	9

6.	5	7	3	0	1	9	1	6	2	7
	4	8	6	7	1	7	6	4	7	1

7.	3	8	9	0	6	8	7	7	4	2
	2	5	3	4	8	3	5	4	2	8

8.	4	9	5	4	6	0	2	5	4	3
	0	0	5	6	2	8	6	2	3	7

9.	1	6	7	7	8	1	5	4	8	2
	0	1	3	2	4	7	3	5	7	9

10.	9	9	4	0	6	1	8	1	9	3
	2	4	8	1	3	9	2	8	1	8

All the fundamental combinations in addition are given on this page, and hence the page should be reviewed frequently.

1. Which number do you find easiest to add to another number? Give four examples.

2. Which number do you find hardest to add to another number? Give four examples.

3. Which two numbers of one figure each do you find hardest to add?

The answers to these questions will reveal the "troublesome" groups, and these should receive attention until they are as familiar as the "easy" groups. In general the combinations given below are the ones that trouble children most. It will be noticed that the most difficult combinations are repeated several times.

Add the following :

4. 8	6	5	5	7	8	7
7	5	8	7	8	6	5

5. 7	6	8	8	8	7	3
5	8	5	7	4	8	8

6. 5	8	8	5	8	6	5
7	8	7	8	6	7	6

7. 4	8	5	6	8	6	7
7	7	7	5	8	6	8

8. 5	6	7	7	7	7	5
6	8	5	6	8	4	9

9. 6	3	9	4	5	9	7
6	9	4	8	8	9	7

DRILL GAME

1. The game we played to-day was Nimble Squirrel. The squirrel jumped from branch to branch and told the sums of the numbers. When he could not give the answers quickly he fell off. Be the nimble squirrel and tell these answers as quickly as you can :

$7 + 2$ $5 + 6$

$6 + 7$ $8 + 9$

$4 + 8$ $9 + 7$

Beginning at the bottom of each column, tell these sums as you jump from branch to branch :

2.	3.	4.	5.	6.
$5 + 2$	$9 + 3$	$8 + 4$	$4 + 6$	$5 + 8$
$3 + 2$	$6 + 3$	$6 + 4$	$8 + 5$	$7 + 6$
$8 + 2$	$2 + 3$	$7 + 4$	$5 + 3$	$3 + 4$
$6 + 2$	$8 + 3$	$5 + 4$	$4 + 2$	$5 + 5$
$9 + 2$	$4 + 3$	$9 + 4$	$7 + 1$	$3 + 9$
$1 + 2$	$3 + 3$	$0 + 4$	$0 + 3$	$2 + 8$
$0 + 2$	$7 + 3$	$1 + 4$	$6 + 9$	$6 + 5$
$2 + 2$	$1 + 3$	$4 + 4$	$9 + 8$	$9 + 6$

ORAL EXERCISE

Add the following :

1.	1	11	21	31	1	11	41	61
	2	2	2	2	3	3	3	3

2.	1	11	51	91	1	21	41	71
	4	4	4	4	5	5	5	5

3.	2	12	22	42	3	23	43	73
	6	6	6	6	5	5	5	5

4.	4	14	24	14	44	64	14	84
	7	7	7	8	8	8	9	9

Add each of the numbers 4, 9, 7, 8, 6 to the following numbers ; read the results first by columns, then by rows :

5.	16	17	18	19	15	13	12
	26	37	58	69	45	23	32
	56	67	78	39	35	63	72
	76	87	68	79	75	83	82

Drill means doing the same thing over and over again so as to secure mechanical efficiency, and the problem is to do this without making the work monotonous. Observe, for instance, that in Ex. 4 the numbers 4 and 7 are added three times, but always under different conditions.

WRITTEN EXERCISE

Add the following :

4	14	7	17	7	7	8	18
3	3	9	9	19	0	1	1
0	0	0	0	0	29	9	9

EP

Column Addition. In adding 3, 5, and 7 we may arrange the numbers in a column, and begin with the lowest figure. Here we have $3 + 5 = 8$, and $8 + 7 = 15$. We see that 15 is the sum, and write it below the line.

We make sure that the work is right by adding from the top down, thus: $7 + 5 = 12$, and $12 + 3 = 15$. We then say that we have *checked* the work, because the two sums are the same.

```
 7
 5
 3
15
```

Teach the child to read a column as he reads a word, as far as this is possible. As he looks at this column he should think, "3, 8, 15," thinking no other words.

ORAL EXERCISE

Add the following :

1.	1	4	5	6	5	2	3	2
	2	3	2	1	1	4	3	3
	3	2	2	1	2	3	3	3

2.	5	4	9	9	9	8	8	3
	0	4	0	1	1	2	1	2
	4	0	0	0	1	0	1	8

WRITTEN EXERCISE

Add the following :

1.	4	4	9	6	7	9	4	5
	2	8	8	6	6	4	3	7
	3	2	2	4	4	6	7	3

2.	2	7	9	7	7	6	9	1
	5	4	1	9	3	2	1	8
	5	6	9	1	6	4	3	8
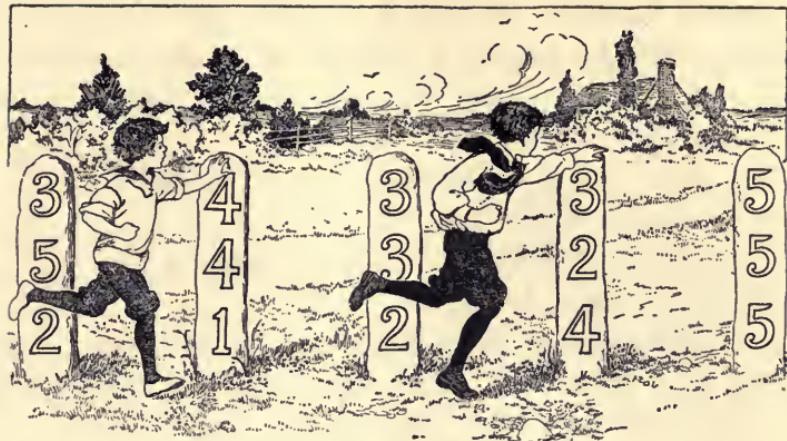
DRILL GAME

1. To-day we played the game of Number Sprinters. If a boy did not give the right answer when he touched a post, he was out of the game.

See how much of a number sprinter you are, by telling the sums in the picture as fast as you can.

Run over these courses, and time yourself for each course :

2. 1	3	3	2	2	2	3	4	1	3
2	2	2	2	3	4	4	4	2	1
5	1	2	4	4	4	4	4	9	5
3. 3	3	2	2	4	4	4	5	5	5
2	3	2	4	3	4	5	4	5	3
5	5	5	5	5	5	5	6	5	7
4. 3	3	3	5	6	3	1	1	1	3
3	4	2	2	3	7	7	8	1	1
7	7	7	8	7	7	8	8	9	9

Column Addition. If you read 35 pages of a book on Monday and 41 pages on Tuesday, how many pages did you read on both days? We see that we must add 35 and 41 to find the answer.

We write the numbers one under the other, ones under ones and tens under tens. Adding the column at the right we have 6; adding the next column we have 7.

$$\begin{array}{r} 41 \\ 35 \\ \hline 76 \end{array}$$

We first write the 6 below the line in the ones' column. We then write the 7 below the line in the tens' column. The sum is 76, and so you read 76 pages in all.

WRITTEN EXERCISE

Add the following :

| 1. | 20 | 21 | 21 | 23 | 23 | 24 | 28 |
| | 30 | 30 | 35 | 35 | 45 | 52 | 71 |

| 2. | 30 | 31 | 33 | 43 | 63 | 73 | 32 |
| | 26 | 26 | 26 | 26 | 26 | 26 | 46 |

| 3. | 40 | 41 | 43 | 53 | 64 | 64 | 38 |
| | 34 | 34 | 34 | 34 | 34 | 35 | 50 |

| 4. | 50 | 52 | 53 | 53 | 53 | 53 | 27 |
| | 25 | 25 | 25 | 26 | 36 | 46 | 61 |

| 5. | 60 | 61 | 61 | 62 | 63 | 63 | 39 |
| | 16 | 16 | 26 | 26 | 26 | 36 | 60 |

| 6. | 70 | 70 | 70 | 70 | 72 | 72 | 23 |
| | 8 | 18 | 28 | 27 | 24 | 27 | 46 |

REVIEW GAMES

1. Some children played this number game. They placed a stick as shown in the picture, and marked an oblong and a circle on the garden sidewalk. They then rolled balls toward the stick. If a ball touches the stick, it counts 5 ; if it stops in the circle, it counts 4 ; if it stops on the oblong but does not touch the stick, it counts 3 ; if it stops anywhere else, it counts 0. If these were the scores, who won the game?

John,	5,	4,	4,	3,	0,	3
Rob,	4,	4,	0,	0,	3,	5
Frank,	4,	5,	3,	0,	0,	5

2. The janitor made this ladder for a number game. The children tried to throw bean-bags through the spaces, each space counting as shown in the picture. If a bag strikes the ladder, it counts 0. These were three scores:

Kate,	3,	2,	0,	0,	4,	1
Mary,	1,	1,	3,	2,	0,	2
Jennie,	4,	3,	2,	0,	0,	2

Who won the game?

VI. SUBTRACTION

ORAL EXERCISE

1. How many cents must we add to 1¢ to make 3¢.

2. How many tens must we add to 1 ten to make 3 tens?

3. How much must we add to 10 to make 30?

4. Name the number which belongs where each star is:

$30 + * = 50$ $21 + * = 27$ $32 + * = 39$

Column Subtraction. If a book has 68 pages and we have read 21 pages, how many pages have we left to read?

We see that we must subtract 21 from 68.

We write the smaller number below the larger number. We first think "$8 - 1 = 7$," and write the 7 below the line, under the 1. We then think "$6 - 2 = 4$," and write the 4 below the line, under the 2.

The result is 47, and so we have 47 pages left to read.

$$\begin{array}{r} 68 \\ 21 \\ \hline 47 \end{array}$$

To make sure that the work is correct, that is, to check the work, we add 47 and 21, the result being 68.

WRITTEN EXERCISE

Subtract the following :

1.	9	90	60	50	55	75	86
	7	70	30	10	10	20	50

2.	88	88	89	98	73	67	59
	30	31	42	16	41	36	27

Subtract the following :

1.	9	90	99	96	87	76	86
	3	30	33	32	43	32	36

2.	7	70	77	78	87	75	95
	4	40	44	42	34	22	25

Copy and subtract :

1.	98	89	93	64	55	63	75
	73	46	31	24	21	52	25

2.	82	78	65	53	31	29	67
	50	37	52	12	11	18	47

3.	68	79	84	86	73	81	39
	11	21	30	22	22	30	7

4.	68	76	69	96	74	77	48
	23	40	24	42	40	25	3

5.	73	94	74	77	95	78	66
	31	50	51	33	61	34	20

6. If Frank has 21 chickens, how many more must he get so as to have 34 chickens in all ?

7. If William has 43 marbles, how many more must he get so as to have 55 marbles in all ?

DRILL TEST. ADDING ONE-FIGURE NUMBERS

Add, and state the answers rapidly :

1. 1	0	7	6	2	8	9	7	3	9
1	2	1	2	1	2	1	2	1	2
2. 0	7	5	7	8	7	9	9	6	8
3	4	5	3	4	5	3	4	5	5
3. 9	7	8	5	8	9	4	9	7	6
5	6	7	6	6	7	5	6	7	8

Such tests may be used for both oral and written work. In the former case the results should be stated rapidly, with no hesitation; in the latter case the numbers should be written neatly, with the answers, and a record kept of the time. The exercise should be repeated from week to week and a comparison made of the speed and accuracy.

DRILL TEST. SUMS TO TWENTY

Add, and state the answers rapidly :

1. 8	11	9	11	10	8	12
10	7	10	9	10	11	6
2. 8	13	7	6	14	7	14
12	5	12	13	2	13	5
3. 14	15	16	5	16	3	16
6	4	3	15	2	15	4
4. 2	18	3	2	19	0	1
17	1	17	18	0	17	19

DRILL TEST. ADDITION

Add, and state the answers rapidly :

1.	1	1	2	2	2	3	3	1	2	3
	1	2	2	2	3	3	3	3	4	4
	2	3	1	3	3	3	4	4	3	4

2.	4	4	4	5	5	5	5	5	5	4
	4	3	4	2	0	5	0	3	5	6
	4	5	5	5	4	5	6	6	6	5

3.	6	5	7	8	8	5	8	9	9	9
	4	7	6	7	8	8	7	0	9	8
	7	6	8	7	6	7	9	8	7	9

DRILL TEST. SUBTRACTION

Subtract, and state the answers rapidly :

1.	19	18	19	18	19	18	17
	1	2	3	6	7	5	5

2.	17	16	15	17	16	15	14
	6	3	5	7	8	7	8

3.	14	13	12	14	13	12	14
	9	9	7	6	8	6	5

4.	12	11	10	12	11	10	11
	5	4	7	8	6	3	7

For " Busy Work " encourage the pupils to write problems fitting such additions and subtractions as those given on this page.

VII. USING WHAT YOU HAVE LEARNED
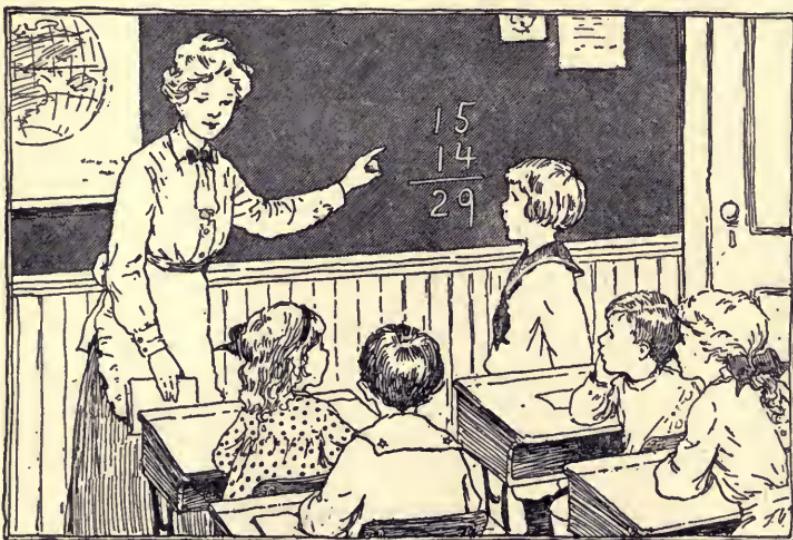
PROBLEMS ABOUT OUR CLASS

1. If there are 14 boys and 15 girls in our class, how many pupils are there in all?

2. Using the numbers in Ex. 1, how many more girls than boys are there in the class?

3. If 14 boys and 15 girls belong in our room, and 1 boy and 1 girl are absent, how many pupils are here to-day?

4. If there are 29 pupils in our class, and 5 less in the class below ours, how many are there in that class?

5. If there are 14 boys in our class, and 9 of them form a baseball team, how many boys of our class are not on the baseball team?

PROBLEMS ABOUT OUR STORE

1. Fred went to the store and bought a pencil for 5¢ and a pad of paper for 6¢. How much did he pay for both?

2. Mary bought an eraser for 5¢, a ruler for 10¢, and a penholder for 3¢. How much did she pay for all?

3. The teacher bought a box of crayons for 30¢ and a blackboard pointer for 8¢. How much did she pay for both?

4. Jennie's mother sent her to the baker's for some little cakes. Jennie bought 6 of one kind and 8 of another kind. How many did she buy in all?

5. I bought a bottle of ink for 10¢, some pens for 8¢, and a pencil for 5¢. How much did I pay for all?

6. The teacher bought a box of colored crayons for 60¢. She gave the dealer 75¢. How much money did he give back to her?

7. Rob bought some candy for 5¢, an apple for 2¢, and an orange for 6¢. How much did he pay for all?

8. At our store they sell colored pencils for 15¢ a box. If I buy a box and give the dealer 25¢, how much money does he give back to me?

9. Make up a problem about buying things at a store, using some of these prices:

Bottle of black ink, 10¢	Pens, 6 for 5¢
Bottle of red ink, 10¢	Pad of paper, 6¢ or 8¢
Penholder, 4¢	Ruler, 10¢
Pencil, 3¢, 5¢, or 8¢	Box of toy money, 25¢

VIII. FRACTIONS

One Half. You may already know what we mean by one half of anything, or by one half of a number.

This picture shows a sphere, and also shows a sphere cut in two halves.

To find half of a number we divide the number by 2.

One half is written like this : $\frac{1}{2}$.

We write two halves, which equals 1, like this : $\frac{2}{2}$.

If we cover a half sphere in the picture, we leave a sphere and a half. One and one half is written $1\frac{1}{2}$.

ORAL EXERCISE

1. How much is $\frac{1}{2}$ of 4 ? $\frac{1}{2}$ of 8 ? $\frac{1}{2}$ of 10 ?

2. Divide 16 by 2 and so find $\frac{1}{2}$ of 16.

3. How much is $\frac{1}{2}$ of 14 ? $\frac{1}{2}$ of 20 ? $\frac{1}{2}$ of 18 ?

4. How much is $\frac{1}{2}$ of a pound and $\frac{1}{2}$ of a pound ?

WRITTEN EXERCISE

1. Write in figures : two and a half.

2. Write in figures : three and a half.

Copy and add :

3. $\frac{1}{2} + \frac{1}{2}$ $3\frac{1}{2} + \frac{1}{2}$ $1\frac{1}{2} + \frac{1}{2}$ $2\frac{1}{2} + \frac{1}{2}$

4. $1 + \frac{1}{2}$ $4\frac{1}{2} + \frac{1}{2}$ $5\frac{1}{2} + \frac{1}{2}$ $6\frac{1}{2} + \frac{1}{2}$

5. Two halves are how many ? Four halves are how many ?

1. What part of the sphere is C?

2. B is how many times as large as C?

3. If you write one half $\frac{1}{2}$, how should you write one fourth? one third?

4. If you put two fourths of a sphere together, what part will you have?

5. Add $\frac{1}{2}$ of a sphere and $\frac{1}{2}$ of a sphere. Add $\frac{1}{2}$ of a sphere, $\frac{1}{4}$ of a sphere, and $\frac{1}{4}$ of a sphere.
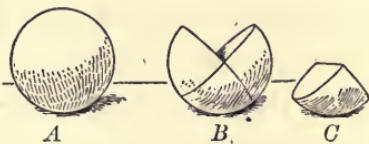
Fourths. We write $\frac{1}{4}$ for one fourth, $\frac{2}{4}$ for two fourths, and $\frac{3}{4}$ for three fourths. B is $\frac{3}{4}$ of a sphere.

You have now seen that

$$\frac{1}{2} + \frac{1}{2} = \frac{2}{2}, \text{ and that } \frac{2}{2} = 1;$$
$$\frac{1}{4} + \frac{1}{4} = \frac{2}{4}, \text{ and that } \frac{2}{4} = \frac{1}{2}.$$

One fourth is also called *a quarter*.

1. Draw a line. Divide it into halves.

2. Draw another line of the same length. Divide it into fourths. How many fourths do you find?

3. Draw a square. Divide it into fourths. How many fourths do you find?

4. Draw a line. Divide it into halves and also into fourths. How many fourths do you find in one half?

1. Point to $\frac{1}{4}$ of these squares. How many squares are $\frac{1}{4}$ of 8 squares?

2. Show that $\frac{1}{2}$ of this oblong equals 2 fourths, and also that 4 fourths of the oblong is the whole.

3. How many squares are $\frac{1}{2}$ of 8 squares? Point to them in two different groups. How many halves make the whole?

1. Draw a square 2 inches on a side. Divide it into squares each 1 inch on a side. Each small square is what part of the large one?

2. Draw an oblong 1 inch high and 2 inches long. Divide it into squares each 1 inch on a side. Each square is what part of the oblong?

3. If a square is 2 inches on a side, how far is it around the square? Draw the square and divide it into squares each $\frac{1}{2}$ inch on a side.

4. Draw a square that is 1 inch high, and another that is 2 inches high. The first of these squares is what part as large as the second?

5. Draw a line and divide it into fourths. How much must you add to $\frac{2}{4}$ of the line to make the whole line?

6. Draw an oblong like the one at the top of this page, and divide it into 8 squares. Put stars in three fourths of the squares.

ORAL EXERCISE

1. How many marks are $\frac{1}{2}$ of 6 marks? ||| |||

2. How many dots are $\frac{1}{2}$ of 8 dots?   :: ::

3. How many stars are $\frac{1}{2}$ of 10 stars?   *****
*****

4. How many marks are $\frac{1}{2}$ of 12 marks? |||||| ||||||

5. How many dots are $\frac{1}{4}$ of 8 dots?   : : : :

Read and learn:

6. $\frac{1}{2}$ of 2 is 1 $\frac{1}{2}$ of 6 is 3 $\frac{1}{2}$ of 10 is 5

7. $\frac{1}{2}$ of 4 is 2 $\frac{1}{2}$ of 8 is 4 $\frac{1}{2}$ of 12 is 6

8. $\frac{1}{4}$ of 4 is 1 $\frac{1}{4}$ of 8 is 2 $\frac{1}{4}$ of 12 is 3

WRITTEN EXERCISE

1. Make 12 marks to show that $\frac{1}{4}$ of 12 is 3.

2. Make 10 stars to show that $\frac{1}{2}$ of 10 is 5.

3. If John has 12¢ and Rob has $\frac{1}{2}$ as much, how much has Rob?

4. If a boy 10 years old has a sister who is $\frac{1}{2}$ as old, how old is the sister?

5. If a man is 6 feet tall and his son is $\frac{1}{2}$ as tall, how tall is his son?

6. There are 12 inches in one foot. How many inches are there in $\frac{1}{4}$ of a foot?

7. How many inches are there in $\frac{1}{2}$ of a foot?

Copy, and write the answers:

8. $\frac{1}{2}$ of 8 $\frac{1}{2}$ of 10 $\frac{1}{2}$ of 2 $\frac{1}{2}$ of 6 $\frac{1}{2}$ of 1

9. $\frac{1}{4}$ of 4 $\frac{1}{4}$ of 12 $\frac{1}{4}$ of 8 $\frac{1}{2}$ of 4 $\frac{1}{2}$ of 12

ORAL EXERCISE

1. We call 12 things a dozen, and we write 1 doz. for one dozen. How many cubes make a dozen cubes?

2. There are 12 inches in a foot. What other name can you give to a dozen inches?

3. Name some things that are sold by the dozen. Can you tell the price?

4. How many cubes make a half dozen cubes? How many cubes make a quarter of a dozen cubes? Point to the cubes in giving each answer.

5. How many fours do you see in a dozen? How many threes? How many twos? How many sixes? Point to the cubes in giving each answer.

6. A hen sits on a dozen eggs and hatches all but two. How many chickens are hatched?

7. When eggs are worth 40¢ a dozen, how much does a half dozen cost?

8. A newsboy buys a dozen papers for 8¢, and sells them at a cent apiece. How much does he make?
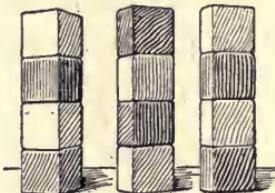
9. John had a dozen firecrackers. When they were lighted, all but $\frac{1}{4}$ of them exploded. How many firecrackers failed to explode? How many exploded?

IX. MEASURES

ORAL EXERCISE

1. What measure is Will using to find the length of the blackboard? The measure is how many inches long?

2. What measure is Mary using to find the height of the blackboard?

3. How many feet in length is the yardstick? Measure it and see.

4. Measure the length of your own blackboard in feet; in yards.

5. How many feet do you think the chalk rack is from the floor? Measure the height and see.

6. If your height is 1 yard and 1 foot, how many feet tall are you?

7. How many feet are there in 1 yard and 2 feet?

Length. In measuring lengths,

$$12 \text{ inches} = 1 \text{ foot}$$
$$3 \text{ feet} = 1 \text{ yard}$$

We write in. for inch or inches, ft. for foot or feet, yd. for yard or yards, 2 ft. 3 in. for 2 feet and 3 inches.

EP

MEASURING EXERCISE

1. A yard is how many times as long as a foot?

2. Measure the width of the room in yards, omitting parts of a yard. Measure this distance in feet.

3. Look at the foot rule. Point to 1 in. on the rule; point to 6 in. How many inches are there in a foot?

4. Draw a line one foot long and divide it into inches. How many inches are 6 in. and 6 in.?

5. Point to 3 in. How many inches are there in 1 ft. less 3 in.? How many inches are there in 1 ft. 3 in.?

6. Point to 4 in. How many inches are there in 1 ft. less 4 in.? How many inches are there in 1 ft. 4 in.?

7. Draw a line that you think is 1 ft. long. Measure it.

8. Draw a line that you think is 6 in. long. Measure it.

9. Is the edge of your desk more than a foot long or less than a foot long? Measure it.

10. Is your desk more than a foot high or less than a foot high? Measure it.

11. Cut a piece of string that you think is 1 yd. long.

12. Draw a line that you think is 1 in. long. Measure it.

13. How many inches are there in 1 ft. less 5 in.?

14. How many inches are there in 1 ft. less 8 in.?

15. Draw a line that you think is 24 in. long. Measure it.

The children should be given much practice in using real measures. They should also exercise their judgment in estimating lengths. A yardstick and a ruler divided into inches, half inches, and quarter inches are desirable for this grade.

1. Which is the pint measure in the picture, and which is the quart?

2. How many pints make a quart? A pint is what part of a quart?

3. Tell me the names of several things that are sold by the pint and the names of others that are sold by the quart.

4. Draw a full-sized picture of a quart measure. Draw a line across it, marking off 1 pint.

2 pints = 1 quart

5. How much is 10 quarts + 1 quart + 1 quart + 1 quart?

Liquid Measure. In measuring liquids,

2 pints = 1 quart

We write pt. for pint or pints, and qt. for quart or quarts. A pint is $\frac{1}{2}$ of a quart.

---

6. How much does a quart of milk cost where we live? How much does a pint of milk cost?

7. If I have a quart of cream and a pint of cream, how many pints of cream do I have?

ORAL EXERCISE

1. The children in the picture have a 2-pound weight and a $\frac{1}{2}$-pound weight to balance the book. Tell me how much the book weighs.

2. Suppose the children should weigh 1 pt. of water and find that it weighs a pound, how much would 1 qt. weigh?

3. If one of your books weighs $\frac{1}{2}$ pound, another $\frac{1}{4}$ pound, and a third $\frac{1}{4}$ pound, how much do all three books weigh?

4. If the children had a pound of figs worth 2 dimes, how much would $\frac{1}{2}$ pound of these figs be worth?

Pounds. We write lb. for pound or pounds. Thus, 2 lb. means 2 pounds, and $\frac{1}{2}$ lb. means $\frac{1}{2}$ of a pound.

5. Add 20 lb., 10 lb., and 1 lb.

6. Add 9 lb., 4 lb., 2 lb., and 1 lb.

7. Find $\frac{1}{2}$ of 4 lb., $\frac{1}{2}$ of 6 lb., and $\frac{1}{2}$ of 2 lb.

8. From 69 lb. subtract 4 lb. and then add 1 lb.

9. From 87 lb. subtract 10 lb., 6 lb., and 1 lb.

It is desirable that children should weigh various objects, using the pound, half pound, and quarter pound. The table of pounds and ounces is taken up later.

X. REVIEW DRILL

ORAL EXERCISE

Add each of the numbers 2, 3, 4, 5, 6, 7, 8, 9, to:

1. 31	51	81	21	71	41	61	91	11
2. 42	82	22	72	52	12	2	32	62
3. 83	33	73	3	13	63	43	23	53
4. 64	44	74	4	34	84	14	54	24
5. 45	85	75	15	55	25	5	65	35
6. 56	46	6	36	66	26	76	16	86
7. 47	67	27	87	77	37	57	7	17
8. 58	48	78	18	88	68	28	8	38
9. 79	39	89	69	29	9	19	49	59

Subtract each of the numbers 2, 3, 4, 5, 6, 7, 8, 9, from:

10. 40	70	90	10	50	80	20	60	30
11. 51	71	41	61	31	91	11	81	21
12. 72	52	12	42	82	62	22	92	32
13. 33	23	93	83	63	13	73	53	43
14. 64	14	44	74	54	24	84	34	94
15. 95	85	65	15	45	25	35	55	75
16. 96	46	86	56	36	66	16	76	26
17. 47	97	57	37	87	17	67	27	77

In exercises of this nature it is not expected that teachers will require all of the work. As soon as the pupils show themselves proficient in the additions and subtractions they should pass to the next topic.

DRILL TEST. FRACTIONS AND MEASURES

State the answers rapidly :.

1. $\frac{1}{2}$ of 4 $\frac{1}{2}$ of 2 $\frac{1}{2}$ of 10 $\frac{1}{2}$ of 6 $\frac{1}{2}$ of 8

2. $\frac{1}{4}$ of 4 $\frac{1}{4}$ of 8 $\frac{1}{4}$ of 12 $\frac{2}{2}$ of 4 $\frac{2}{4}$ of 4

3. $\frac{1}{2}$ of 12 in. $\frac{1}{2}$ of 1 doz. $\frac{1}{2}$ of 8 ft. $\frac{1}{2}$ of \$6

4. $\frac{1}{4}$ of 12 in. $\frac{1}{4}$ of 1 doz. $\frac{1}{4}$ of 8 yd. $\frac{1}{2}$ of 6¢

5. In 1 yd. there are (?) ft. A foot is (?) of a yard.

6. In 1 ft. there are (?) in.; in 2 ft. there are (?) in.

7. In 1 qt. there are (?) pt. A pint is (?) of a quart.

8. $\frac{1}{2}$ of a pound and $\frac{1}{2}$ of a pound are (?) pound.

9. $1 + \frac{1}{2}$ $1\frac{1}{2} + \frac{1}{2}$ $1\frac{1}{2} + 1$ $2\frac{1}{2} + \frac{1}{2}$

10. $1 + \frac{1}{4}$ $1\frac{1}{4} + 1$ $2 + \frac{1}{4}$ $2\frac{1}{4} + 1$

11. $\frac{3}{4}$ of a sphere and $\frac{1}{4}$ of the same sphere make (?).

12. $\frac{1}{2}$ of a pound and $\frac{1}{4}$ of a pound and $\frac{1}{4}$ of a pound make (?) pound.

13. In 1 qt. there are (?) pt.; in 2 qt. there are (?) pt.

14. In 1 yd. there are (?) ft.; in 2 yd. there are (?) ft.

15. In 1 ft. there are (?) in.; in 2 ft. there are (?) in.

16. A foot is (?) in. more than $\frac{1}{2}$ ft.

17. A yard is (?) ft. more than 1 ft.

18. A quart is (?) pt. more than 1 pt.

19. A nickel is (?) cents, and 2 nickels make (?) dime, or (?) cents.

20. In \$1 there are (?) dimes, or (?) cents.

21. In 3 yd. there are (?) ft.; in 4 yd. there are (?) ft.

XI. USING WHAT YOU HAVE LEARNED

ORAL EXERCISE

1. Fred's father gives him 3¢ an hour for weeding the garden. How much does Fred earn in 2 hours?

2. If Fred works long enough to earn 30¢, and then buys a 25-cent ball, how much does he have left?

3. If he wishes to buy an orange that costs 3¢, how long will he have to work to earn the money?

4. How much does a good rubber ball cost? If Fred has 24¢, is this too much or too little to buy the ball?

5. Fred has 1¢ in his pocket. If he earns 3¢ an hour, how long will it take him to earn 9¢, so that he can buy 10¢ worth of marbles?

6. Julia's aunt wishes to show her what it means to earn money. She pays her 4¢ an hour. Julia worked half an hour this morning before school. How much did she earn then?

7. After school Julia worked an hour. How much has she earned to-day?

8. Julia wished to earn enough to buy 15¢ worth of ribbon. After she worked 2 hours at 4¢ an hour had she enough? Had she enough after she worked 3 hours? How much did she then lack?

9. After Julia had worked 4 hours she found she had earned more than enough for her ribbon. How much more?

There is always some advantage in letting a pupil do simple multiplication by means of addition. It makes the subject of multiplication seem more valuable when it is reached.

10. Fred's father sent him to the store to buy a basket. He gave Fred a 25-cent piece. Fred paid 20¢ for the basket. How much money did he have left?

11. Fred saw at the store a baseball mitt. He has saved 40¢ toward buying it. The mitt costs 50¢. How much more money must he have?

12. Julia's aunt sent her to the store to buy a dozen eggs. Julia finds that they have only $\frac{1}{2}$ doz. to sell. How many eggs must she buy at another store to make up the dozen?

13. Julia pays 20¢ for $\frac{1}{2}$ doz. eggs. How much would she have to pay for a dozen?

14. Julia's aunt sends her to buy 2 qt. of milk. If Julia pays 8¢ for a quart, how much does she pay for 2 qt.?

15. Fred is sent to the store to buy $\frac{1}{2}$ doz. bananas. How many bananas does he buy?

16. If Fred buys $1\frac{1}{2}$ doz. oranges, how many oranges does he buy? First find how many oranges there are in a dozen, then in $\frac{1}{2}$ doz., and then in $1\frac{1}{2}$ doz.

17. Fred pays 8¢ for some salt, and gives the storekeeper a dime. How much change does he get back?

18. Julia is making some doll's clothes. She needs $\frac{1}{2}$ yd. of ribbon which costs 12¢ a yard. How much must she pay for $\frac{1}{2}$ yd.?

19. Julia's aunt asks her to find how much the breakfast cost. Julia found that the oatmeal cost 10¢, the milk 5¢, the bread and butter 4¢, and the meat 20¢. How much did she find that all these cost?

XII. LITTLE EXAMINATIONS

I.
1. $3 + 9.$ 5. $\frac{1}{2}$ of 8.   9. 2 pt. = (?) qt.
2. $17 - 8.$ 6. $\frac{1}{4}$ of 12.   10. 1 yd. = (?) ft.
3. $22 + 6.$ 7. $\frac{1}{4}$ of 8¢.   11. $1\frac{1}{2} + \frac{1}{2}.$
4. $45 - 30.$ 8. $\frac{1}{2}$ of 6¢.   12. $12 + 23 + 2.$

II.
1. $5 + 8.$ 5. $\frac{1}{2}$ of 8 ft.   9. 4 pt. = (?) qt.
2. $14 - 6.$ 6. $\frac{1}{4}$ of 8 ft.   10. 1 ft. = (?) in.
3. $42 + 10.$ 7. $\frac{1}{4}$ of 12.   11. $2\frac{1}{2} + 3.$
4. $62 - 31.$ 8. $\frac{1}{2}$ of 12.   12. $23 + 45 + 1.$

III.
1. $37 + 6.$ 5. $\frac{1}{2}$ of 10¢.   9. 1 pt. = (?) qt.
2. $14 - 7.$ 6. $\frac{1}{4}$ of 8 in.   10. 2 yd. = (?) ft.
3. $52 + 13.$ 7. $\frac{1}{4}$ of 12 lb.   11. $2\frac{1}{2} + \frac{1}{2}.$
4. $74 - 21.$ 8. $\frac{1}{4}$ of 12 qt.   12. $51 + 6 + 11.$

IV.
1. $54 + 8.$ 5. $\frac{1}{2}$ of 10.   9. 6 pt. = (?) qt.
2. $13 - 5.$ 6. $\frac{1}{2}$ of \$10.   10. 2 ft. = (?) in.
3. $38 + 20.$ 7. $\frac{1}{4}$ of 12¢.   11. $3 + 2\frac{1}{2}.$
4. $66 - 22.$ 8. $\frac{1}{4}$ of \$12.   12. $31 + 22 + 12.$

V.
1. $77 + 7.$ 5. $\frac{1}{2}$ of 20.   9. 2 qt. = (?) pt.
2. $13 - 6.$ 6. $\frac{1}{2}$ of 14.   10. 6 ft. = (?) yd.
3. $73 + 14.$ 7. $\frac{1}{2}$ of 12 lb.   11. $3\frac{1}{2} + \frac{1}{2}.$
4. $79 - 32.$ 8. $\frac{1}{4}$ of 16.   12. $33 + 40 + 1.$

These Little Examinations at the close of each chapter furnish excellent review drill work. The time should be recorded for each, and the pupils should endeavor to improve their records. This work may be used for review in the first part of the next chapter.

CHAPTER II

I. NUMBERS TO 1000

ORAL EXERCISE

1. Here are 4 bundles of splints, 10 in a bundle. How many splints are there? Write the number on the blackboard.
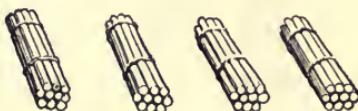
2. If there are 5 such bundles of splints, how many splints are there in all? Write the number on the blackboard.

3. Here are 3 bundles of splints, 100 in a bundle. How many splints are there? Write the number on the blackboard. If there were 400 more, how many splints would there be? Write the number on the blackboard.
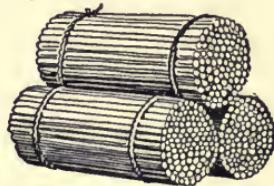
4. Here is a larger bundle of splints, containing as many splints as there are in 10 bundles of 100 each. How many splints are there in this bundle?
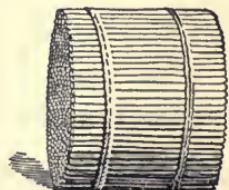
5. How many 10's are there in 100? How many 100's are there in 1000? What is the name for ten 10's? What is the name for ten 100's?

1. How many splints are there in the picture?

$$300 \quad + \quad 40 \quad + \quad 2$$
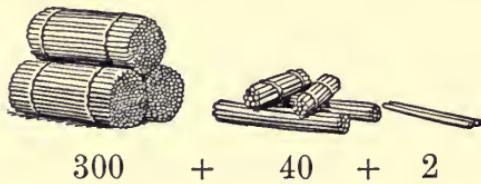
2. Read these numbers:

342	372	100	101	203	110	123
352	392	200	202	105	890	987
362	312	302	102	705	111	999

3. Open this book at page 146; at page 110.

4. The numbers below 10 are called *ones*. For example, 6 is six ones. We write the ones in the right-hand place. In the number 26 there are 2 tens and 6 ones. Where do we write the *tens?* Where do we write the *hundreds?*

5. Name the figure in ones' place in 475; the figure in tens' place; the figure in hundreds' place.

1. Write in figures:

Five hundred fifty-five	Six hundred nine
Two hundred forty-nine	Three hundred three
One hundred twenty-one	Eight hundred eighty

2. Write in words:

242	207	520	634	987	843	765

ORAL EXERCISE

Read these numbers :

1. 208	210	217	237	286	506	242
2. 348	376	407	473	530	721	346
3. 691	682	707	827	936	888	989

4. What is the ones' figure in 450 ? the tens' figure ? the hundreds' figure ?

WRITTEN EXERCISE

Write in figures :

1. One hundred one   One hundred fifty
2. Two hundred three   Two hundred seventy
3. Three hundred six   Three hundred ninety
4. Four hundred nine   Five hundred forty
5. Six hundred six   Seven hundred eight

Write in words :

| 6. 527 | 642 | 334 | 456 | 678 | 909 | 742 | 830 | 303 |
| 7. 708 | 860 | 901 | 777 | 800 | 750 | 630 | 400 | 1000 |

Write in figures :

8. Forty-three   Eight hundred seventy-seven
9. Twenty-one   Seven hundred eighty-nine
10. Fifty-two   Nine hundred ninety-nine
11. Seventy-eight   Six hundred seventy-eight
12. Five hundred   Five hundred sixty-seven
13. Six hundred   Six hundred seventy-three
14. Seven hundred   Seven hundred twenty-seven

1. Read the figures on the clock.

2. Which hand tells the hours? Which tells the minutes?

3. How long does it take the hour hand to pass from I to II? How long does it take the minute hand to pass from I to II?

4. How long does it take the hour hand to pass around from XII to XII again? How long does it take the minute hand?

5. What time is it by the clock in the picture? What time is it by the school clock?

6. How many minutes in an hour? in $\frac{1}{2}$ hour?
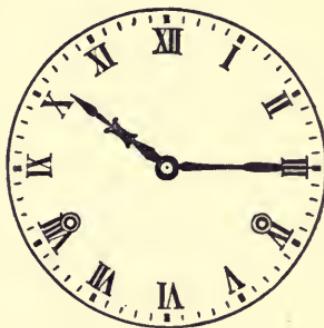
Roman Numerals. The figures often seen on clocks are called *Roman numerals*, and are as follows:

I	II	III	IIII or IV	V	VI	VII	VIII	IX	X	XI	XII
1	2	3	4	5	6	7	8	9	10	11	12

Time. Read and learn:

> 60 minutes = 1 hour
> 24 hours = 1 day

We write min. for minute or minutes, hr. for hour or hours, da. for day or days, A.M. for forenoon, and P.M. for afternoon. We write 15 minutes after 2 in any of these three ways: 2 15, 2 : 15, or 2 hr. 15 min.

II. ADDITION

ORAL REVIEW DRILL

Add the following :

1.	6	16	26	96	7	27	47	87
	3	3	3	3	5	5	5	5

2.	4	14	34	64	5	37	55	25
	7	7	7	7	6	6	6	6

3.	8	28	48	78	3	13	33	53
	4	4	4	4	8	8	8	8

4.	9	39	59	89	7	37	57	87
	2	2	2	2	9	9	9	9

5.	3	43	43	65	2	35	48	62
	9	9	8	7	8	6	7	8

6.	7	37	58	58	8	68	52	63
	8	8	8	7	6	6	9	9

7.	6	26	46	46	6	56	27	38
	6	6	6	8	7	7	7	7

8.	9	49	79	79	8	38	57	69
	9	9	9	7	8	8	8	8

9.	7	57	58	79	4	34	37	38
	4	4	4	5	9	9	5	6

10.	4	63	54	84	5	95	94	97
	8	8	8	4	5	5	6	3

1. If you have 12 marbles and 6 marbles, how many do you have in all?

2. If you have 12¢ and 10¢, how much do you have in all?

3. If there are 11 girls and 10 boys in the class, how many children are there in all?

Add the following:

4. 12	12	12	20	25	35	48
6	8	10	20	20	20	30

5. 50	51	57	58	67	22	35
30	30	30	40	30	11	11

WRITTEN EXERCISE

Add the following:

1. 30	32	32	42	45	87
40	40	45	35	32	3

2. 33	33	63	63	64	76
60	66	30	36	35	4

3. 70	74	74	75	74	93
24	20	21	23	25	7

4. 160	166	166	176	277	342
200	210	213	223	322	523

5. 273	428	579	343	628	496
401	320	210	343	231	300

Adding Two-Figure Numbers. 1. If I have 46¢ and 37¢, how much money have I in all?

I may think of 46 and 37 like this :

$$46 = 40 + 6,\text{ or 4 tens and }6\text{ ones}$$
$$37 = \underline{30 + 7},\text{ or }\underline{3\text{ tens and }7\text{ ones}}$$
The sum is $70 + 13$, or 7 tens and 13 ones, or 83

The teacher should put the above solution on the blackboard, and should lead the pupils to see that they might add the ones and tens separately, as here shown. This is too long, however, and so we add without all this work.

We add the numbers as shown below.

```
46
37
13 = sum of ones
 7 = sum of tens
83 = sum of numbers
```

We see that 7 ones and 6 ones are 13 ones, and we write the 3 in the ones' column and add the 1 to the tens.

Then $1 + 3 + 4 = 8$, and we write the 8 in the tens' column.

```
46
37
83
```

The sum is 83, and so I have 83¢ in all.

2. If I have 24 marbles, 38 marbles, and 16 marbles, how many marbles have I in all?

We add the numbers as here shown.

We see that the sum of the ones is $6 + 8 + 4$, or 18, and we write the 8 in the ones' column and add the 1 to the tens.

Then $1 + 1 + 3 + 2 = 7$, and we write the 7 in the tens' column.

```
24
38
16
78
```

The sum is 78, and so I have 78 marbles in all.
EP

WRITTEN EXERCISE

Add the following :

1. 24	23	23	21	25	35	65
36	37	38	39	39	17	25
2. 22	34	33	67	34	47	37
38	47	59	23	46	15	17
3. 32	24	36	26	58	29	53
48	28	36	37	25	16	38
4. 35	47	65	27	72	33	56
35	26	18	19	19	18	29
5. 48	56	39	47	55	78	74
27	39	29	38	19	16	18
6. 59	73	66	48	68	37	49
26	19	24	23	15	27	16
7. 29	52	29	35	19	27	58
48	29	39	45	39	46	18
8. 27	38	59	46	25	44	25
37	43	17	36	35	37	38
9. 21	36	45	37	56	49	47
19	18	15	17	18	29	36
10. 11	21	32	13	14	15	16
28	36	49	48	48	48	23
33	48	26	38	38	38	46

Adding Three-Figure Numbers. We often have to add numbers of three figures.

John worked on Saturday for Mr. Eastman, the grocer. Mr. Eastman told John to look over two boxes of apples and throw away the bad ones. John found 156 good apples in one box and 117 in the other. How many good apples did he find in all?

We see that we must add 156 and 117.

156
117
273

7 ones + 6 ones = 13 ones = 1 ten + 3 ones. We write the 3 in the ones' column and add the 1 to the tens.

1 ten + 1 ten + 5 tens = 7 tens. We write the 7 in the tens' column.

1 hundred + 1 hundred = 2 hundreds. We write the 2 in the hundreds' column.

The sum is 273, and so John found 273 good apples.

WRITTEN EXERCISE

1. There are 186 oranges in one box and 107 in another box. How many oranges are there in both boxes?

2. There are 127 boys and 134 girls in a school. How many pupils are there in the school?

3. Sam tied 338 ft. of string and 125 ft. of string together to make a kite string. How long was the kite string?

Add the following, and check the work:

4.	5.	6.	7.	8.	9.
278	346	227	625	506	$329
104	229	347	135	206	225

Addition Continued. Mr. Eastman told John to count the oranges which were left after the day's sale. In one box there were 172 oranges and in another box 156 oranges. How many oranges were left in the two boxes?

$$\begin{array}{r} 172 \\ 156 \\ \hline 328 \end{array}$$

We see that we must add 172 and 156.

6 ones + 2 ones = 8 ones. We write the 8 in the ones' column.

5 tens + 7 tens = 12 tens = 1 hundred + 2 tens. We write the 2 in the tens' column and add the 1 to the hundreds.

1 hundred + 1 hundred + 1 hundred = 3 hundreds. We write the 3 in the hundreds' column.

The sum is 328, and so there are 328 oranges left.

The teacher will observe that on page 61 the sum of the ones (units) was more than 10, while on this page the sum of the tens is more than 10 (tens). On page 63 the general case is considered.

WRITTEN EXERCISE

1. There are 140 sheep in one pasture and 174 sheep in another pasture. How many sheep are there in all?

2. It is 143 miles from here to the place where Rob lives, and 162 miles further to the place where James lives. How far is it from here to the place where James lives?

Add the following, and check the work:

3.	4.	5.	6.	7.	8.
263	374	382	491	282	$473
142	251	166	275	370	264

Addition Continued. Mr. Forbes has a corner lot. He is building a picket fence on the sides facing the two streets. He needs 196 pickets on one side and 188 on the other side. How many pickets does he need in all?

We see that we must add 196 and 188.

8 ones + 6 ones = 14 ones = 1 ten + 4 ones. We write the 4 in the ones' column and add the 1 to the tens.

```
 196
 188
 384
```

1 ten + 8 tens + 9 tens = 18 tens, or 1 hundred + 8 tens. We write the 8 in the tens' column and add the 1 to the hundreds.

1 hundred + 1 hundred + 1 hundred = 3 hundreds. We write the 3 in the hundreds' column.

The sum is 384, and so Mr. Forbes needs 384 pickets.

WRITTEN EXERCISE

1. If Mr. Forbes needs 187 pickets for a fence on one side of his lot and 165 pickets for a fence on another side, how many pickets does he need for both sides?

Add the following, and check the work:

2.	3.	4.	5.	6.	7.
288	357	349	281	555	239
368	285	68	399	278	471

8.	9.	10.	11.	12.	13.
200	301	110	240	125	379
325	288	229	386	474	206
295	322	291	285	199	98

III. SUBTRACTION

Subtraction Reviewed. If Louis has 7 marbles and loses 4 of them, he has 3 marbles left; if he has 17 marbles and loses 4 of them, he has 13 marbles left; and if he has 27 marbles and loses 4 of them, he has 23 marbles left. That is,

$$7 - 4 = 3 \qquad 27 - 4 = 23 \qquad 47 - 4 = 43$$
$$17 - 4 = 13 \qquad 37 - 4 = 33 \qquad 57 - 4 = 53$$

This kind of drill on subtraction by endings is valuable. For example, because $8 - 6 = 2$, we know that $18 - 6 = 12$, $28 - 6 = 22$, and so on.

ORAL REVIEW DRILL

Subtract the following :

1.	11	21	31	61	10	20	30	70
	2	2	2	2	3	3	3	3

2.	12	22	32	82	13	23	33	93
	4	4	4	4	5	5	5	5

3.	14	24	34	74	15	25	65	85
	7	7	7	7	6	6	6	6

4.	16	26	46	76	17	27	57	77
	8	8	8	8	9	9	9	9

5.	18	28	48	98	16	36	56	86
	9	9	9	9	7	7	7	7

6.	15	25	14	34	12	32	11	41
	7	7	8	8	6	6	7	7

Subtraction Continued. When one number is subtracted from another, the larger number is called the *minuend*, the smaller number is called the *subtrahend*, and the result is called the *difference* or *remainder*.

If there are 47 pupils in one room and 28 pupils in another, how many more are there in the first room?

We subtract as here shown.

We cannot take 8 ones from 7 ones, so we take 1 ten of the 4 tens and put it with the 7 ones, making 17 ones.

Minuend,	47
Subtrahend,	28
Difference,	19

Then 17 ones $-$ 8 ones $=$ 9 ones.

Then 2 tens from the 3 tens remaining leaves 1 ten. The difference is 1 ten and 9 ones, or 19.

This shows what we did, and also shows the check.

$$47 = 30 + 17 \qquad 28$$
$$28 = 20 + 8 \qquad 19$$
$$19 = 10 + 9 \qquad 47$$

There are two leading methods of subtraction used in the business world.

1. We may think of the above numbers as follows:

$$47 = 40 + 7 \quad \text{or} \quad 30 + 17$$
$$28 = \phantom{40 + 7 \quad \text{or} \quad} 20 + 8$$
Subtracting, we have $\phantom{47 = 40 + 7 \quad \text{or} \quad} 10 + 9 = 19$

This subtraction may be performed either directly, by taking 8 from 17, and 20 from 30; or indirectly, by thinking "8 and 9 are 17, 2 and 1 are 3."

2. We may think of both numbers as increased by 10.

Instead of 47 we shall have $ 40 + 17$
Instead of 28 we shall have $ 30 + 8$
Subtracting as before, we have $ 10 + 9 = 19$

Either of these plans is allowable, and all are used in business.

WRITTEN EXERCISE

Subtract, and check:

1. 53	61	72	81	65	91	83
28	32	28	53	37	56	25
2. 94	96	54	62	82	80	76
66	78	27	43	54	37	29
3. 74	63	73	83	55	63	95
46	47	39	65	39	29	38
4. 56	76	64	57	75	90	65
48	49	26	28	48	47	29

5. Frank has 28 marbles and Tom has 43. How many more marbles has Tom than Frank?

6. A schoolroom is 42 ft. long and 28 ft. wide. It is how much longer than wide?

7. In playing a game John's score was 31 and Fred's was 19. Find the difference in their scores.

8. A boy is 12 years old and his father is 41 years old. How much older is the father than his son?

9. A girl has a piece of cloth 41 in. long. She cuts off 27 in. for a doll's dress. How much has she left?

10. There are 31 children in one class and 28 in another. How many more are there in one class than in the other?

11. A man has 92 hens and sells 75 of them. How many hens has he left?

Subtracting Three-Figure Numbers. If there are 701 children in one city school and 240 in another, how many more are there in one school than in the other?

We see that we must subtract 240 from 701.

We write the numbers as here shown.

We see that $1 - 0 = 1$, and we write the 1 below the 0 and the 1.

```
 701
 240
 461
```

We cannot take 4 tens from 0 tens, so we take 1 hundred of the 7 hundreds, making 100, or 10 tens.

Then $10 \text{ tens} - 4 \text{ tens} = 6 \text{ tens}$, and we write the 6 below the 4 and the 0.

The 7 hundreds is now 6 hundreds, because we took 1 hundred away.

Then $6 \text{ hundreds} - 2 \text{ hundreds} = 4 \text{ hundreds}$, and we write the 4 below the 2 and the 7.

The difference is 461, and so there are 461 more children in one school than in the other.

We check the work by adding 240 to 461.

WRITTEN EXERCISE

Subtract, and check the work:

1.	732	743	754	765	708	802
	250	270	290	283	296	591
2.	583	842	927	916	823	730
	291	391	645	424	460	263
3.	839	819	829	935	708	820
	567	577	577	442	523	575

Further Work in Subtraction. If there are 731 pupils in one city school and 246 in another, how many more are there in the first school than in the second?

We see that we must subtract 246 from 731.

To subtract 246 from 731 we write the numbers as here shown.

We cannot take 6 from 1, so we take 1 ten of the 3 tens and put it with the 1, making 11.

$$\begin{array}{r} 731 \\ 246 \\ \hline 485 \end{array}$$

Then $11 - 6 = 5$, and we write the 5 below the 6 and 1.

The 3 tens are now 2 tens, because we took 1 ten away. We cannot take 4 tens from 2 tens, so we take 1 hundred of the 7 hundreds and put it with the 2 tens, making 120, or 12 tens.

Then $12 \text{ tens} - 4 \text{ tens} = 8 \text{ tens}$, and we write the 8 below the 4 and the 3.

Then 6 hundreds $- 2$ hundreds $= 4$ hundreds, and we write the 4 below the 2 and the 7.

The difference is 485, and so there are 485 more pupils in the first school than in the second.

Another Example. If there are 700 pupils in one school and 246 in another, how many more are there in the first school than in the second?

We see that we must subtract 246 from 700.

We cannot take 6 from 0, or 4 from 0, so we think of 700 as $600 + 90 + 10$.

$$\begin{array}{r} 700 \\ 246 \\ \hline 454 \end{array}$$

Then $10 - 6 = 4$, $9 \text{ tens} - 4 \text{ tens} = 5 \text{ tens}$, and 6 hundreds $- 2$ hundreds $= 4$ hundreds.

The difference is 454, and so there are 454 more pupils in the first school than in the second.

Subtract, and check the work:

1.	911	621	722	645	523	821
	385	384	388	387	287	642

2.	713	925	632	617	927	731
	396	456	469	438	679	496

3.	515	651	834	722	722	832
	296	392	688	485	433	468

4.	735	913	536	643	635	936
	268	688	398	288	388	428

5.	912	834	826	925	813	914
	335	495	237	358	426	769

6.	716	814	841	922	833	644
	328	227	356	488	539	298

7.	113	103	203	413	703	703
	4	4	4	104	205	215

8. If Robert picks 324 apples and Jack picks 187, how many more apples does Robert pick than Jack?

9. In a city school of 523 pupils 267 are girls. How many pupils are boys?

10. It is 660 ft. around a running track. After a boy has run 480 ft. of this distance, how much farther must he run to go all the way around?

ORAL REVIEW TEST

Subtract each of the numbers 2, 3, 4, 5, 6, 7, 8, and 9 in turn from each of the following numbers:

1. 10	21	32	43	54	65	76	87	98
2. 62	72	41	20	97	52	61	40	83
3. 31	86	95	51	85	71	42	63	60
4. 96	30	70	82	50	92	73	53	81
5. 75	93	91	84	80	11	55	74	64

WRITTEN REVIEW TEST

Subtract 468 from each of these numbers:

1. 512.   2. 601.   3. 725.   4. 836.   5. 957.

Subtract 379 from each of these numbers:

6. 425.   7. 536.   8. 648.   9. 717.   10. 800.

Subtract 254 from each of these numbers:

11. 506.   12. 521.   13. 632.   14. 703.   15. 812.

Subtract 337 from each of these numbers:

16. 425.   17. 502.   18. 616.   19. 723.   20. 900.

Subtract 576 from each of these numbers:

21. 841.   22. 723.   23. 900.   24. 811.   25. 612.

Subtract 624 from each of these numbers:

26. 721.   27. 712.   28. 801.   29. 813.   30. 900.

If the check is insisted upon, it will give a review of addition.

IV. MULTIPLICATION AND DIVISION TABLES

ORAL EXERCISE

1. Frank's father has sent him to buy 3 postage stamps for letters. How much must Frank pay for each stamp? How much must he pay for the 3 stamps?

2. How much is $2 + 2$? How much is $2 + 2 + 2$? How much is $2 + 2 + 2 + 2$?

3. If Frank's father sends him for 4 postage stamps for letters, how much money must he give him?

4. If Frank's father has 5 letters to mail, how much do the stamps cost for all of these letters? Which is better, to add $2 + 2 + 2 + 2 + 2$, or to know without adding how many five 2's are?

5. Frank did not know how many five 2's are, and his father told him to count by 2's, like this: 2, 4, 6, and so on. Then Frank found how many five 2's are. How many are they?

6. How many are three 2's? How many are four 2's?

7. Can *you* count by 2's, beginning at 2 and ending at 10? Try it.

8. Can *you* count by 2's to 12? to 14? to 18? to 20? to 22? Try it.

9. Can you tell how much Frank would have to pay for ten 2¢ stamps?

It is advisable to introduce real, concrete problems of this nature when a new subject is begun, so as to show the purpose of the work. These problems should relate to the home or school interests of the pupils.

1. Add the columns of 2's, from one 2 to five 2's.

2. On the blackboard and on paper build more columns
of 2's, until you have ten 2's in the
last column. How many columns are
there?

3. Read the columns, thus: "One
2 is 2, two 2's are 4, three 2's are 6,"
and so on.

4. How many are five 2's? six 2's?
seven 2's? eight 2's? nine 2's? ten 2's?

```
              2
           2  2
        2  2  2
     2  2  2  2
  2  2  2  2  2
  ─  ─  ─  ─  ─
```

5. Read and learn this table of 2's, thus: "Two 2's are
4" (or else "two times 2 are 4"), and so on:

$2 \times 2 = 4$	$5 \times 2 = 10$	$8 \times 2 = 16$
$3 \times 2 = 6$	$6 \times 2 = 12$	$9 \times 2 = 18$
$4 \times 2 = 8$	$7 \times 2 = 14$	$10 \times 2 = 20$

6. How much is 1×2? 2×1? 2×0? 0×2?

7. State these products:

2×3	2×7	2×8	2×5
2×6	2×4	2×9	2×10

The pupils should be made to see that if they know 6×2, they also
know 2×6; therefore these inverse drills should be carried right along
with the tables.

8. How much is $2 + 2 + 2$? 3×2?

9. How much is $2 + 2 + 2 + 2$? 4×2?

10. Read and learn: $11 \times 2 = 22$; $12 \times 2 = 24$.

ORAL EXERCISE

1. At 2 cents each, how much will 3 tablets cost?

2. At 2 cents each, how much will 4 pencils cost?

3. At 2 cents each, how much will 7 papers cost?

At 2 cents each, find the cost of the following :

4. 5 penholders.

5. 8 spools of thread.

6. 6 pears.

7. 7 yards of braid.

8. 9 postage stamps.

9. 4 pictures.

10. 9 calendars.

11. 8 newspapers.

If $5 \times 2 + 1$ is equal to $10 + 1$, state the values of :

12. $5 \times 2 + 3$.

13. $4 \times 2 + 1$.

14. $3 \times 2 + 1$.

15. $8 \times 2 + 5$.

16. $9 \times 2 + 4$.

17. $7 \times 2 + 3$.

18. $6 \times 2 + 1$.

19. $8 \times 2 + 3$.

20. $5 \times 2 + 4$.

This carrying drill is of great importance in multiplication.

WRITTEN EXERCISE

Multiply the following :

1. 2	2	4	2	2	2	1	9	0	2
2	4	2	6	8	9	3	2	2	0
2. 2	3	2	5	2	6	1	2	7	8
3	2	5	2	7	2	2	1	2	2

3. We have placed here 2 rows of four dots each, or 4 columns of 2 dots each. This shows easily that 2×4 dots $= 4 \times 2$ dots. Draw 12 small squares, to show that 6×2 squares $= 12$ squares, and that 2×6 squares $= 12$ squares.
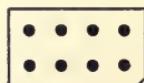
1. How many 2's do you see in 4? How many 2's do you see in 6?

2. How many 2's do you see in 8? How many 2's do you see in 10?

3. 8 contains 2 how many times?

$$
\begin{array}{rrrrr}
 & & & & 2 \\
 & & & 2 & 2 \\
 & & 2 & 2 & 2 \\
 & 2 & 2 & 2 & 2 \\
2 & 2 & 2 & 2 & 2 \\
\hline
2 & 4 & 6 & 8 & 10 \\
\end{array}
$$

Division. The answer to Ex. 3, " 8 contains 2 four times," is written

$$8 \div 2 = 4 \qquad\qquad 2 \overline{)8 \atop 4}$$

In each case 8 is called the *dividend*, 2 is called the *divisor*, and 4 is called the *quotient*.

The quotient multiplied by the divisor equals the dividend.

The quotient is sometimes placed above the dividend, as in long division, and any school may require this arrangement. It is not, however, the business custom, and it is inconvenient in some advanced work.

4. State the values of the following:

4×2	5×2	6×2	7×2
2×4	2×5	2×6	2×7
$8 \div 2$	$10 \div 2$	$12 \div 2$	$14 \div 2$
$8 \div 4$	$10 \div 5$	$12 \div 6$	$14 \div 7$

5. Read and learn:

$4 \div 2 = 2$	$10 \div 2 = 5$	$16 \div 2 = 8$
$6 \div 2 = 3$	$12 \div 2 = 6$	$18 \div 2 = 9$
$8 \div 2 = 4$	$14 \div 2 = 7$	$20 \div 2 = 10$

ORAL EXERCISE

1. Add the columns of 3's, from one 3 to five 3's.

2. On the blackboard and on paper build more columns of 3's, until you have ten 3's in the last column. How many columns are there?

3. Read the columns, thus: "One 3 is 3, two 3's are 6, three 3's are 9," and so on.

4. How many are five 3's? six 3's? seven 3's? eight 3's? nine 3's? ten 3's?

				3
			3	3
		3	3	3
	3	3	3	3
3	3	3	3	3

5. Read and learn the table of 3's, thus: "Two 3's are 6" (or else "two times 3 are 6"), and so on.

$$2 \times 3 = 6 \qquad 5 \times 3 = 15 \qquad 8 \times 3 = 24$$
$$3 \times 3 = 9 \qquad 6 \times 3 = 18 \qquad 9 \times 3 = 27$$
$$4 \times 3 = 12 \qquad 7 \times 3 = 21 \qquad 10 \times 3 = 30$$

6. How much is 1×3? 3×1? 3×0? 0×3?

7. State these products:

$$3 \times 2 \qquad 3 \times 7 \qquad 3 \times 9 \qquad 3 \times 4$$
$$3 \times 3 \qquad 3 \times 5 \qquad 3 \times 6 \qquad 3 \times 8$$

8. How much is $3 + 3$? 2×3?

9. How much is $3 + 3 + 3$? 3×3?

10. How much is $3 + 3 + 3 + 3$? 4×3?

Complete the following:

11. $2 \times = 6.$ **13.** $ \times 3 = 12.$ **15.** $2 \times 3 =$

12. $3 \times = 9.$ **14.** $ \times 3 = 15.$ **16.** $7 \times 3 =$

EP

1. Count by 3's from 3 to 36.

2. Repeat the multiplication table of 3's to 10×3.

3. Read and learn :

$$11 \times 3 = 33 \qquad\qquad 12 \times 3 = 36$$

State the answers to the following :

4. $4 \times 3 + 1.$ **6.** $5 \times 3 + 2.$ **8.** $6 \times 3 + 2.$

5. $7 \times 3 + 5.$ **7.** $8 \times 3 + 1.$ **9.** $9 \times 3 + 3.$

10. How much is 3×0 ? 0×3 ? 2×0 ? 0×2 ?

11. If 1 orange costs 3 cents, how much will 6 oranges cost? How much will 9 oranges cost?

12. If 1 pencil costs 3 cents, how much will 7 pencils cost? How much will 8 pencils cost?

13. If 1 piece of burlap used in making a carpet for a doll's house costs 3 cents, how much will 8 pieces cost?

Copy and complete the following :

1. $4 \times \quad = 12$	$2 \times \quad = 6$	$\times 3 = 0$
2. $6 \times \quad = 18$	$5 \times \quad = 15$	$\times 3 = 24$
3. $9 \times \quad = 27$	$7 \times \quad = 21$	$\times 3 = 18$
4. $8 \times \quad = 24$	$11 \times \quad = 33$	$\times 3 = 36$

5. If 1 chair costs \$3, how much will 7 chairs cost? How much will 9 chairs cost?

6. If 1 school desk costs \$3, how much will 12 school desks cost? How much will 11 school desks cost?

ORAL EXERCISE

1. How many 3's do you see in 6?
How many 3's do you see in 9?

2. How many 3's do you see in 12?
How many 3's do you see in 15?

3. How many more 3's are there
in 15 than in 12?

4. State the values of:

$$
\begin{array}{ccccc}
& & & & 3 \\
& & & 3 & 3 \\
& & 3 & 3 & 3 \\
& 3 & 3 & 3 & 3 \\
3 & 3 & 3 & 3 & 3 \\
\hline
3 & 6 & 9 & 12 & 15
\end{array}
$$

4×3	5×3	7×3	9×3
3×4	3×5	3×7	3×9
$12 \div 3$	$15 \div 3$	$21 \div 3$	$27 \div 3$
$12 \div 4$	$15 \div 5$	$21 \div 7$	$27 \div 9$

5. How much is 8×3? 3×8? $24 \div 3$? $24 \div 8$?

6. How much is 6×3? 3×6? $18 \div 3$? $18 \div 6$?

WRITTEN EXERCISE

1. At $3\cent$ each, how many bananas can be bought for $9\cent$?
for $15\cent$? for $24\cent$? for $30\cent$?

2. At $3\cent$ each, how many pencils can be bought for $12\cent$?
for $18\cent$? for $21\cent$? for $27\cent$?

3. At $3\cent$ each, how many oranges can be bought for $9\cent$
and $12\cent$ together?

4. How many threes in a dozen? in a half dozen?

5. Copy and complete:

$\div 3 = 9$	$\div 3 = 6$	$\div 3 = 8$
$\div 3 = 7$	$\div 3 = 5$	$\div 3 = 4$

ORAL EXERCISE

1. At 3¢ each, how many cakes can be bought for 12¢? for 18¢? for 6¢? for 9¢? for 15¢?

2. If 3 sheep cost $24, how much does each one cost?

3. If a freight train goes a mile in 3 minutes, how many miles will it go in 30 minutes?

4. A yard is 3 ft. How many yards in 30 ft.?

5. How many yards of braid, at 3¢ a yard, can be bought for 18¢?

6. If you need 27 sheets of paper to make 3 notebooks, how many sheets will you need for 1 notebook?

7. At 3¢ each, how many oranges can be bought for 30¢? for 21¢? for 12¢? for 18¢?

8. If you need 3 yd. of cloth for each skirt, how many skirts of this kind can you make from 27 yd.? from 18 yd.? from 21 yd.? from 12 yd.?

WRITTEN EXERCISE

1. Copy this table and learn it:

$6 \div 3 = 2$	$15 \div 3 = 5$	$24 \div 3 = 8$
$9 \div 3 = 3$	$18 \div 3 = 6$	$27 \div 3 = 9$
$12 \div 3 = 4$	$21 \div 3 = 7$	$30 \div 3 = 10$

Copy and complete the following:

2. $9 \div \ \ = 3.$	**5.** $6 \div \ \ = 3.$	**8.** $12 \div 2 =$
3. $12 \div \ \ = 6.$	**6.** $6 \div \ \ = 2.$	**9.** $12 \div 3 =$
4. $12 \div \ \ = 4.$	**7.** $8 \div 2 =$	**10.** $21 \div \ \ = 7.$

1. Add the columns of 4's, from one 4 to five 4's.

2. On the blackboard and on paper, build more columns of 4's, until you have ten 4's in the last column. Then read the columns, thus: "One 4 is 4, two 4's are 8," and so on.

```
              4
           4  4
        4  4  4
     4  4  4  4
  4  4  4  4  4
  —  —  —  —  —
```

3. Read and learn the table of 4's:

$2 \times 4 = 8$	$5 \times 4 = 20$	$8 \times 4 = 32$
$3 \times 4 = 12$	$6 \times 4 = 24$	$9 \times 4 = 36$
$4 \times 4 = 16$	$7 \times 4 = 28$	$10 \times 4 = 40$

4. How much is 1×4? 4×1? 4×0? 0×4?

5. How much is $4 + 4 + 4 + 4 + 4$? 5×4?

6. State these products:

4×3	4×8	4×9	4×7
4×5	4×6	4×2	4×10

1. There are 4 quarts in 1 gallon. How many quarts are there in 5 gallons? in 7 gallons? in 9 gallons?

2. A square has 4 sides. How many sides have 8 squares?

3. A cow has 4 feet. How many feet have 2 cows? 7 cows? 6 cows? 8 cows? 10 cows?

4. If a man can earn $4 a day, how many dollars can he earn in 9 da.? in 7 da.? in 8 da.?

ORAL EXERCISE

1. How many dots are there in each of these squares? How many squares are there in the upper row? How many dots are there in the squares of the upper row?

2. How many dots are there in the squares of the lower row? How can you find this

without adding all the dots in the squares of this row?

3. How many squares are there in all? How can you find the number of dots without adding? How many dots are there in all?
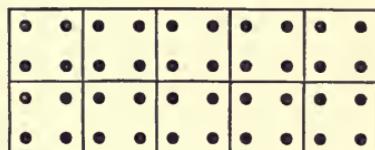
State the answers to the following:

4. $5 \times 4 + 1.$	**7.** $8 \times 4 + 3.$	**10.** $3 \times 4 + 2.$
5. $7 \times 4 + 3.$	**8.** $9 \times 4 + 2.$	**11.** $2 \times 4 + 1.$
6. $6 \times 4 + 2.$	**9.** $4 \times 4 + 3.$	**12.** $8 \times 4 + 2.$

WRITTEN EXERCISE

1. There are 4 stalks of corn in a hill. How many stalks are there in 7 such hills?

2. If there are 4 apples in each of 9 groups, how many apples are there in all the groups?

3. How many shoes does it take to shoe 3 horses? to shoe 5 horses? to shoe both 3 horses and 5 horses?

4. One man has 3 horses to be shod, and another man has 4 horses to be shod. How many shoes are needed for all the horses?

1. How many times does 8 contain 4?

2. How many 4's do you see in 12? in 20? in 16? in 4?

3. How many times does 16¢ contain 4¢? 20¢ contain 4¢?

4. State the values of:

2×4	7×4	9×4
4×2	4×7	4×9
$8 \div 4$	$28 \div 4$	$36 \div 4$
$8 \div 2$	$28 \div 7$	$36 \div 9$

$$\begin{array}{ccccc} & & & & 4 \\ & & & 4 & 4 \\ & & 4 & 4 & 4 \\ & 4 & 4 & 4 & 4 \\ 4 & 4 & 4 & 4 & 4 \\ \hline 4 & 8 & 12 & 16 & 20 \end{array}$$

5. If four boys have equal scores in a game and the total score is 12, what is each score?

6. Read and learn this table:

$8 \div 4 = 2$	$20 \div 4 = 5$	$32 \div 4 = \ 8$
$12 \div 4 = 3$	$24 \div 4 = 6$	$36 \div 4 = \ 9$
$16 \div 4 = 4$	$28 \div 4 = 7$	$40 \div 4 = 10$

1. In 1 gallon there are 4 qt. How many gallons are there in 28 qt.? in 36 qt.?

2. If 24 boys are marching, 4 in a line, how many lines of boys are there?

Copy and complete:

3. $24 \div 4 =$ $16 \div \ \ = 4$ $40 \div 4 =$

4. $32 \div 4 =$ $28 \div \ \ = 7$ $36 \div 4 =$

1. Add the columns of 5's, from one 5 to five 5's.

2. On the blackboard and on paper build more columns
of 5's until you have ten 5's in the
last column. Then read the columns,
thus: " One 5 is 5, two 5's are 10,"
and so on.

3. Read and learn the table of 5's :

$2 \times 5 = 10$ $5 \times 5 = 25$ $8 \times 5 = 40$

$3 \times 5 = 15$ $6 \times 5 = 30$ $9 \times 5 = 45$

$4 \times 5 = 20$ $7 \times 5 = 35$ $10 \times 5 = 50$

```
              5
           5  5
        5  5  5
     5  5  5  5
  5  5  5  5  5
  ─  ─  ─  ─  ─
```

4. How much is 1×5? 5×1? 5×0? 0×5? 5×5?

5. State these products :

5×3	5×9	5×6	5×4
5×7	5×2	5×8	5×10

1. If we go to school 5 days a week for 3 weeks, how
many days are we in school?

2. If it costs 5¢ to telephone, and a man telephones 9
times, how much does it cost him?

3. If a class marches in rows of 5, and there are 7 rows,
how many pupils are there in the class?

Copy and complete the following :

4. $4 \times 5 + 2 =$ $6 \times 5 + 3 =$ $8 \times 5 + 7 =$

5. $9 \times 5 + 7 =$ $5 \times 5 + 4 =$ $3 \times 5 + 2 =$

1. How many 5's are there in 5? in 10? in 15? in 20? in 30? in 45? in 35? in 50?

2. State rapidly the results:

$40 \div 5$ $30 \div 5$ $15 \div 5$ $35 \div 5$

3. Read and learn this table:

$10 \div 5 = 2$	$25 \div 5 = 5$	$40 \div 5 = \ 8$
$15 \div 5 = 3$	$30 \div 5 = 6$	$45 \div 5 = \ 9$
$20 \div 5 = 4$	$35 \div 5 = 7$	$50 \div 5 = 10$

4. At 5¢ each, how many oranges can you buy for 20¢? for 40¢? for 25¢? for 50¢?

5. At $5 a day, how many days must a man work in order to earn $30?

Copy and complete the following:

1. $35 \div \quad = 7$ $\div 5 = 4$ $15 \div 5 =$

2. $45 \div \quad = 9$ $\div 5 = 9$ $40 \div 5 =$

3. How many 5-yard lengths can be made from 45 yd. of cloth? from 35 yd.? from 25 yd.?

4. At 5¢ each, how many oranges can you buy for 35¢? for 45¢? for 15¢?

5. At 5¢ each, how many bottles of mucilage can you buy for 40¢? for 50¢? for 20¢?

6. If it is 15 ft. around a flower bed, and each side is 5 ft. long, how many sides are there?

ORAL REVIEW

1. There are 2 boys standing by each of 6 desks. How many boys are standing?

2. There are 2 girls standing by each of 8 desks. How many girls are standing?

3. There are 2 pt. in a quart. How many pints are there in 9 qt.? How many pints are there in 10 qt.?

4. How many bananas at 2¢ each can you buy for 16¢? How many bananas can you buy for 18¢?

5. At 4¢ each, how many oranges can you buy for 12¢? How many oranges can you buy for 32¢?

6. If you have 20¢, how many oranges can you buy at 3¢ each, and how much money will you have left?

WRITTEN REVIEW

1. If our class has 24 pupils in it, and they march in 4 lines, how many pupils will there be in each line?

2. If there are 27 boys in school, how many baseball nines can be formed?

3. If you buy a two-cent stamp, 3 one-cent stamps, and a one-cent postal card, how much will they all cost?

4. If Mr. Wood earns $3 a day, how much will he earn in 9 days?

5. If Mr. Wood earns $3 a day, how many days must he work to earn $24?

6. If Mr. Wood has $19 and earns $9 more, how much money does he have then?

V. MULTIPLICATION

ORAL EXERCISE

Multiply rapidly :

1. 2	3	4	5	4	2	3	5	2	3
2	4	5	2	3	3	9	3	9	5

2. 4	2	5	4	2	4	3	1	2	4
2	5	4	4	6	6	8	5	7	8

How to Multiply. If you have 23 marbles and John has three times as many, how many marbles has John?

To multiply 23 by 3 we see that 3×3 ones $= 9$ ones, and we write the 9 below the line, in the ones' column.

Then 3×2 tens $= 6$ tens, and we write the 6 below the line, in the tens' column.

The result is 69, so John has 69 marbles.

23 is called the *multiplicand*
 3 is called the *multiplier*
69 is called the *product*

```
23
 3
──
69
```

WRITTEN EXERCISE

Multiply the following :

1. 13	41	42	23	24	32	322
2	2	2	2	2	2	2

2. 21	31	22	11	14	23	231
3	3	4	4	2	3	3

1. Count by 2's from 2 to 20.

2. Recite the multiplication table of 2's.

3. Count by 3's from 3 to 30.

4. Recite the multiplication table of 3's.

5. Recite the multiplication table of 4's.

Find the following products :

6.	7.	8.	9.	10.	11.	12.	13.
21	51	63	52	41	63	72	81
2	2	2	3	4	3	4	5

14. Each side of a triangular park is 54 ft.
long. How far is it around the park? Look at
this multiplication and tell what is the product
of the ones. Tell what is the product of the
tens. Tell what is the whole product.

$$\begin{array}{r} 54 \\ 3 \\ \hline 12 \\ 15 \\ \hline 162 \end{array}$$

15. In Ex. 14, what way do you see of mak-
ing the work shorter?

Further Multiplication. If there are 48 apple trees in
each of 4 rows, how many trees are there in all?

The short way of multiplying, and the one
which we should always use, is shown here.

We see that 4×8 ones are 32 ones. Write
the 2 in the ones' place and add the 3 tens to
the 4×4 tens, making 19 tens.

$$\begin{array}{r} 48 \\ 4 \\ \hline 192 \end{array}$$

The product is 192, so there are 192 trees.

ORAL EXERCISE

1. At 8¢ a quart, what will 4 qt. of milk cost?
2. How much is 2×8¢? 3×8¢? 4×8¢?
3. At 9¢ each, what will 3 tablets cost?
4. At \$7 each, what will 4 desks cost?

Multiply the following :

5. 9	8	4	0	1	7	2	8
3	4	7	3	3	4	9	2

6. 3	6	0	1	8	4	7	9
7	4	9	9	3	4	3	4

WRITTEN EXERCISE

Multiply the following :

1. 53	12	44	79	33	22	222
4	5	7	2	8	3	3

2. 48	64	13	57	80	12	121
4	4	5	3	4	4	4

3. 34	55	75	24	68	32	322
3	4	2	1	4	5	3

4. 67	42	44	86	34	21	211
2	7	8	3	9	4	4

5. 89	78	56	31	97	63	231
3	2	3	6	4	4	4

ORAL DRILL TEST. ADDITION

Add rapidly :

1.	12	13	14	15	17	18	19
	5	4	5	6	3	7	8

2.	23	24	25	26	27	28	29
	4	5	7	5	7	9	6

3.	32	33	34	45	56	67	88
	6	2	7	8	7	9	7

4.	10	20	30	51	63	75	82
	6	7	8	7	8	5	8
	3	4	4	2	2	9	9

ORAL DRILL TEST. SUBTRACTION

Subtract rapidly :

1.	18	17	15	25	25	35	75
	5	7	8	8	18	18	18

2.	19	29	44	53	53	73	93
	4	14	14	4	14	14	24

3.	11	31	31	31	51	70	70
	5	5	15	25	25	20	25

4.	17	37	57	52	51	61	71
	12	12	22	22	22	22	23

ORAL DRILL TEST. MULTIPLICATION

Multiply rapidly :

1. 2×2.	**8.** 3×2.	**15.** 3×6.	**22.** 4×9.
2. 2×6.	**9.** 3×8.	**16.** 4×5.	**23.** 5×2.
3. 2×7.	**10.** 3×3.	**17.** 3×7.	**24.** 6×5.
4. 2×9.	**11.** 4×6.	**18.** 4×8.	**25.** 5×3.
5. 2×8.	**12.** 4×7.	**19.** 3×5.	**26.** 5×4.
6. 2×5.	**13.** 4×4.	**20.** 5×5.	**27.** 8×5.
7. 2×10.	**14.** 3×10.	**21.** 4×10.	**28.** 5×10.

State rapidly the answers :

29. $8 \times 2 + 1$.	**33.** $5 \times 3 + 2$.	**37.** $6 \times 4 + 3$.
30. $7 \times 3 + 1$.	**34.** $4 \times 3 + 1$.	**38.** $8 \times 5 + 4$.
31. $9 \times 2 + 1$.	**35.** $6 \times 2 + 1$.	**39.** $9 \times 4 + 2$.
32. $6 \times 3 + 2$.	**36.** $7 \times 5 + 4$.	**40.** $7 \times 5 + 3$.

ORAL DRILL TEST. DIVISION

Divide rapidly :

1. $8 \div 2$.	**9.** $9 \div 3$.	**17.** $12 \div 4$.	**25.** $25 \div 5$.
2. $6 \div 3$.	**10.** $30 \div 3$.	**18.** $30 \div 5$.	**26.** $36 \div 4$.
3. $6 \div 2$.	**11.** $27 \div 3$.	**19.** $16 \div 4$.	**27.** $40 \div 5$.
4. $16 \div 2$.	**12.** $18 \div 3$.	**20.** $10 \div 5$.	**28.** $50 \div 5$.
5. $20 \div 2$.	**13.** $24 \div 3$.	**21.** $20 \div 4$.	**29.** $32 \div 4$.
6. $18 \div 2$.	**14.** $15 \div 3$.	**22.** $35 \div 5$.	**30.** $45 \div 5$.
7. $12 \div 2$.	**15.** $21 \div 3$.	**23.** $15 \div 5$.	**31.** $20 \div 5$.
8. $10 \div 2$.	**16.** $12 \div 3$.	**24.** $24 \div 4$.	**32.** $28 \div 4$.

VI. USING WHAT YOU HAVE LEARNED
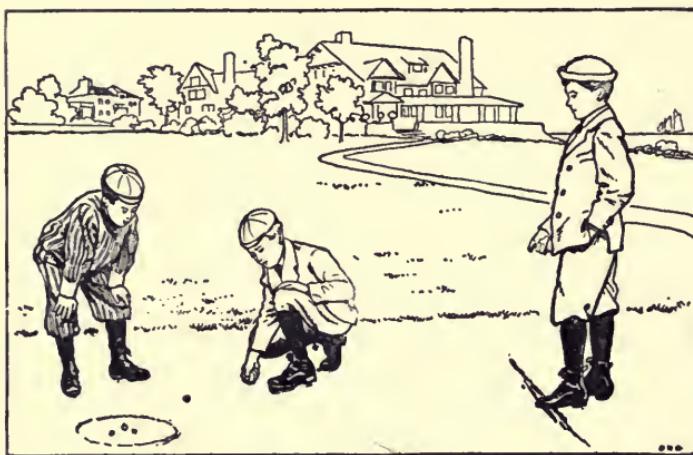
NUMBERS USED IN PLAY

1. If each of these three boys has 17 marbles, how many marbles have they in all?

2. If each of the three boys should buy 12 more marbles, how many more marbles would they all have?

3. If each of the three boys has 34 marbles, how many marbles do they all have?

4. If you are playing a game, and Fred's score is 29 and your score is twice as many, what is your score?

5. In a football game Jack's team scored 14 points and Rob's team scored this number multiplied by 3. How many points did Rob's team score?

6. Mr. Wilson's golf score was 88 and Mr. Brown's was 9 more. How much was Mr. Brown's score?

DRESSING THE DOLLS

1. Mollie has two dolls. One cost 35¢ and the other cost 50¢. How much did both cost?

2. Mollie bought 2 yd. of cloth at 25¢ a yard to make dresses for her dolls. How much did the cloth cost?

3. Mollie bought 3 yd. of lace for the dresses. The lace cost 12¢ a yard. How much did the lace cost in all?

4. A doll's necklace was made by stringing beads. There were 8 beads to an inch. How many beads were there in 5 in.? How many were there in 2 in.? How many were there in $\frac{1}{2}$ in.?

5. Mollie uses $\frac{1}{2}$ yd. of ribbon for sashes for her dolls. The ribbon costs 16¢ a yard. How much must she pay for the $\frac{1}{2}$ yd.? How do you find $\frac{1}{2}$ of 16?

6. Mollie uses $\frac{1}{4}$ yd. of ribbon on a doll's waist. If 1 yd. costs 16¢, how much must she pay for the $\frac{1}{4}$ yd.?

7. For one of her dolls Mollie buys a pair of shoes for 20¢, a pair of stockings for 5¢, a skirt for 15¢, and a hat for 25¢. How much does she pay for all?

8. Mollie buys 4 strings of beads for trimming. There are 48 beads on each string. How many beads has she?

9. Mollie sees some strings of beads that the storekeeper says have 5 dozen beads on a string. How many beads are 5 dozen beads?

10. Make a list of things for two dresses for a doll, and tell how much you think they would cost.

This page may be used for the girls, and page 92 for the boys.
EP

PROBLEMS ABOUT GAMES

1. Ralph buys a baseball mitt for 50¢ and a bat for 30¢. How much does he pay for both?

2. It is 90 ft. from the home base to first base, and 90 ft. from first base to second. How far does Ralph run in going from home base to first base and then to second base?

3. How far does Ralph run in making a home run?

4. At one ball game in the school grounds there were 275 tickets sold, and at another 336 tickets. How many were sold for the two games?

5. The girls played bean-bag. Jennie's score was 15, 20, 18, 34. What was her total score?

6. The boys played ring toss. Jack's score was 12, 18, 9, 17, 24. What was his total score?

7. Fred has a baseball mitt worth 75¢ and John has a bat worth 30¢. If they trade fairly, how much money should John give Fred in addition to the bat?

8. If a top costs 6¢, marbles 5¢ a dozen, and a ball 25¢, how much will a top, a ball, and a dozen marbles cost?

9. How much must I pay for 24 marbles at 5¢ a dozen?

10. Cut nine squares of paper each small enough to fit in one of these little squares. On them write the nine figures 1, 2, 3, and so on to 9. Then see if you can put them in these squares so that the sum of any three numbers in the same row, in the same column, or in the same diagonal shall be 15.

VII. DIVISION

ORAL EXERCISE

1. How do you find half of 4 ? half of 8 ? half of 12 ?

2. If you wish to find one fourth of 8, how do you do it ?

3. If Mary has 24 ¢ in her bank and spends one fourth of it, how much money does she spend ?

4. If Mary wishes to buy $\frac{1}{2}$ of a yard of cloth that costs 16 ¢ a yard, how much money must she spend ?

5. Mary buys 20 buttons and uses one fourth of them. How many does she use ? How do you find out ?

6. If Mary has 24 hooks and eyes and uses one fourth of them, how many hooks and eyes does she use ?

7. Mary bought 18 buttons and used half of them. How many buttons had she left ?

8. If Mary has 28 in. of ribbon and cuts it into pieces that are 7 in. long, how many pieces will she have ? How do you find this number ?

9. If Mary should have 84 in. of ribbon and should cut it into pieces that are 7 in. long, how would you find the number of pieces ? Can you find it without pencil and paper ? Can you see how to find it with the help of pencil and paper ?

Teachers will at once see that this exercise is intended to lead up to the necessity for knowing more about division. Ex. 9 should lead the pupil to see that he must now learn something new. If any pupils can work the example already, the teacher should make one that they cannot work. In this way they will feel the necessity for further study of division.

How to Divide. John has 48 marbles and Robert has one fourth as many. How many marbles has Robert?

We see that we must divide 48 by 4.

To divide 48 by 4 we write the numbers as here shown. Then 4 tens ÷ 4 = 1 ten, and we write the 1 in the tens' place.

$$\begin{array}{r} 4\overline{)48} \\ \hline 12 \end{array}$$

Then 8 ones ÷ 4 = 2 ones, and we write the 2 in the ones' place.

The quotient is 12, and so Robert has 12 marbles.

We check our work by multiplying the quotient by the divisor. If the product equals the dividend, the work is correct. Here $4 \times 12 = 48$.

WRITTEN EXERCISE

1. Divide by 2; that is, find $\frac{1}{2}$ of:

24　28　42　48　66　82　84　844

2. Divide by 3; that is, find $\frac{1}{3}$ of:

33　36　60　69　39　96　66　666

3. Divide by 4; that is, find $\frac{1}{4}$ of:

44　40　80　88　84　24　48　444

4. Divide 63 by 3. Make a problem about $63 \div 3$.

5. There are 88 apple trees in 4 equal rows. How many apple trees are there in each row?

6. At 3¢ each, how many pencils can you buy with 36¢? with 63¢? with 90¢?

The division of three-figure numbers should grow naturally out of the division of two-figure numbers, as above.

Remainder in Division. If you have 23¢, how many oranges can you buy at 5¢ each, and how much money will you have left?

We know that 4 fives are 20, so $23 \div 5 = 4$, and there is 3 left over.

So we see that we can buy 4 oranges, and there will be 3¢ left over.

$$5 \overline{)23}$$
$$4$$
$$3 \text{ remainder}$$

We say that 23 is not exactly divisible by 5, and that the *quotient* is 4 and the *remainder* is 3.

If there is no remainder, the division is said to be *exact*.

ORAL EXERCISE

State rapidly the quotients and remainders:

1. $10 \div 3$.	**3.** $32 \div 3$.	**5.** $42 \div 4$.	**7.** $41 \div 5$.
2. $13 \div 4$.	**4.** $11 \div 3$.	**6.** $25 \div 3$.	**8.** $47 \div 4$.

WRITTEN EXERCISE

1. At 5¢ each, how many oranges can you buy with 57¢, and how much money will you have left?

2. At 4¢ a pound, how many pounds of sugar can you buy with 43¢, and how much money will you have left?

3. At 2¢ each, how many postage stamps can you buy with 25¢, and how much money will you have left?

Divide, giving the quotients and remainders:

4. $45 \div 2$.	**7.** $67 \div 2$.	**10.** $63 \div 2$.	**13.** $81 \div 2$.
5. $35 \div 3$.	**8.** $34 \div 3$.	**11.** $64 \div 3$.	**14.** $97 \div 3$.
6. $68 \div 3$.	**9.** $94 \div 3$.	**12.** $95 \div 3$.	**15.** $67 \div 3$.

Further Work in Division. If one orange costs 3 ¢, how many oranges can you buy with 57 ¢?

In dividing 57 by 3 we see that we have 5 tens ÷ 3 = 1 ten, with 2 tens left over.

$$3)\overline{57} \\ 19$$

We write the 1 in the tens' place in the quotient, below the 5 tens.

2 tens + 7 ones = 27 ones, which is to be divided by 3.

27 ones ÷ 3 = 9 ones, and we write the 9 in the ones' place, below the 7 ones.

The quotient is 19, and so you can buy 19 oranges.

Check. 3 × 19 = 57.

WRITTEN EXERCISE

1. Divide by 2; that is, find $\frac{1}{2}$ of:

    32   34   52   58   72   96   44   448

2. Divide by 3; that is, find $\frac{1}{3}$ of:

    72   24   87   54   48   81   63   363

3. Divide by 4; that is, find $\frac{1}{4}$ of:

    56   52   64   72   96   92   36   364

4. At 4 ¢ each, how many oranges can you buy with 52 ¢?

Divide the following :

5. 90 ÷ 3   84 ÷ 3   78 ÷ 3   57 ÷ 3   993 ÷ 3

6. 88 ÷ 4   84 ÷ 4   93 ÷ 3   76 ÷ 4   999 ÷ 3

7. If the dividend is 75 and the divisor is 3, what is the quotient?

8. At 2 ¢ each, how many apples can you buy with 36 ¢?

VIII. FRACTIONS

ORAL EXERCISE

1. This circle has been divided into how many equal parts?

2. Each of these equal parts is called what part of the circle?

3. If a line is divided into three equal parts, each is what part of the line?

4. What is one of the three equal parts of anything called? What does $\frac{1}{3}$ of a circle mean?

5. There are three feet in a yard. Then 1 foot is what part of a yard?

6. What is meant by $\frac{1}{3}$? by $\frac{1}{3}$ of a dozen?

7. How much is $\frac{1}{3}$ of 3 in.? $\frac{1}{3}$ of 3 pounds?

8. How long is a line that is $\frac{1}{3}$ of a line 3 ft. long?
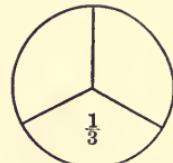
WRITTEN EXERCISE

1. Draw a line 3 in. long and mark off $\frac{1}{3}$ of it.

2. Draw a line 1 in. long. Then extend the line so that it is $\frac{1}{2}$ in. longer. Mark off $\frac{1}{3}$ of the whole line.

3. Here are 6 stars arranged in 3 equal groups. How many stars are $\frac{1}{3}$ of 6 stars?

4. Draw 9 stars and separate them into three equal groups. How many stars are $\frac{1}{3}$ of 9 stars?

5. Draw 12 stars and separate them into 2 equal groups. How many stars are $\frac{1}{2}$ of 12 stars?

1. Block B is how many times as large as C? Then C equals what part of B?
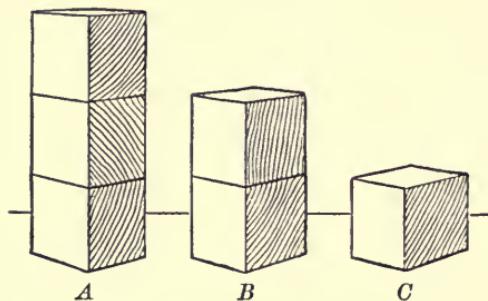
2. Block A is how many times as large as C? Then C equals what part of A?

3. If C weighs 1 pound, how many pounds does B weigh? If B weighs 1 pound, how many pounds does C weigh?

4. If C weighs 1 pound, how many pounds do A and B together weigh?

5. If B weighs 1 pound, how many pounds do A and C together weigh?

6. If C is 1 foot high, how many feet high is A? If B is 1 foot high, how high is C?

7. Is C more or less than half of A? Then which is greater, $\frac{1}{3}$ or $\frac{1}{2}$?

Copy and complete:

1. $\frac{1}{3} + \frac{1}{3} =$ **3.** $\frac{1}{3} - \frac{1}{3} =$ **5.** $\frac{1}{3}$ of $6 =$

2. $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} =$ **4.** $1 - \frac{1}{2} =$ **6.** $\frac{1}{3}$ of $9 =$

ORAL EXERCISE

1. Which block is 5 times as large as *E*?

2. Which block is $\frac{1}{5}$ (one fifth) as large as *A*?

A   B   C   D   E
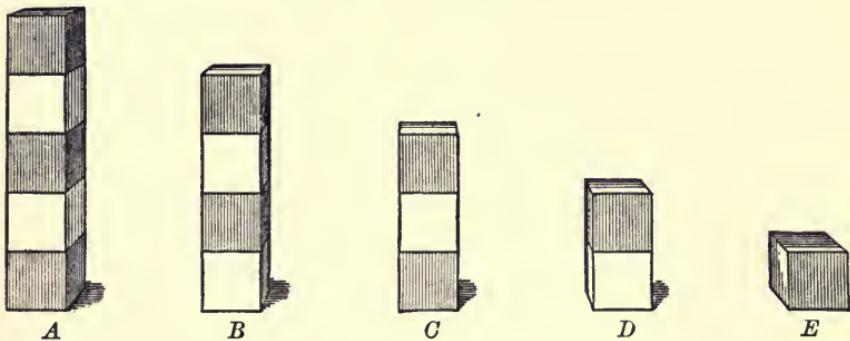
3. Point to a block that is $\frac{2}{5}$ as large as *A*.

Point to blocks as follows:

4. $\frac{3}{5}$ as large as *A*.   **6.** $\frac{2}{3}$ as large as *C*.

5. $\frac{4}{5}$ as large as *A*.   **7.** $\frac{3}{4}$ as large as *B*.

8. If we call *A one*, what shall we call *E*? *D*? *C*? *B*?

9. If we call *B one*, what shall we call *E*? *D*? *C*?

10. Using blocks *B*, *C*, *D*, and *E*, show that $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$, and that $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$.

WRITTEN EXERCISE

1. Draw a line 10 inches long and another 2 inches long. The 2-inch line is what part as long as the 10-inch line?

2. Draw a line $\frac{2}{5}$ as long as the 10-inch line.

3. Draw a line $\frac{4}{5}$ as long as the 10-inch line. It is how many inches long?

1. If we divide a circle into thirds and cut each third into halves, how many equal parts are there? What is each part called? How many sixths of a circle in 1 circle?
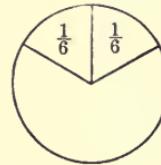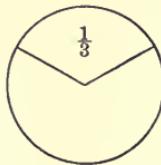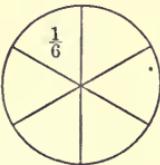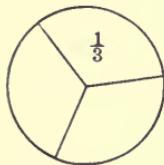
2. Mary gave $\frac{1}{6}$ of a pie to Julia, $\frac{1}{6}$ to Ruth, and $\frac{1}{6}$ to John. How many sixths did she give away?

3. John's mother gave him $\frac{1}{3}$ of a pie and he gave $\frac{1}{2}$ of his piece to Ray. What part of the pie did Ray receive?

4. Show $\frac{1}{3}$ of this oblong; $\frac{1}{6}$ of it. $\frac{1}{6}$ is what part of $\frac{1}{3}$?
$\frac{1}{3}$ = how many sixths?
$\frac{1}{2}$ = how many sixths?
Then $\frac{1}{2} + \frac{1}{6}$ = how many

sixths? $\frac{1}{3} + \frac{1}{6}$ = how many sixths? $\frac{1}{2} + \frac{1}{3}$ = how many sixths?
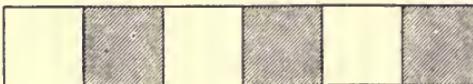
1. This oblong shows that $1 - \frac{1}{6} = \frac{5}{6}$. Draw nine more oblongs like this one and shade them to show the following:

$1 - \frac{5}{6} = \frac{1}{6}$	$\frac{1}{2} = \frac{3}{6}$	$\frac{1}{6} + \frac{1}{6} = \frac{1}{3}$	
$1 - \frac{1}{2} = \frac{3}{6}$	$\frac{1}{3} = \frac{2}{6}$	$\frac{2}{6} + \frac{1}{6} = \frac{1}{2}$	
$1 - \frac{1}{3} = \frac{2}{3}$	$\frac{2}{3} = \frac{4}{6}$	$\frac{1}{3} + \frac{1}{6} = \frac{1}{2}$	
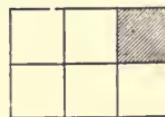
2. Draw an oblong 6 inches long and 1 inch wide. Draw other oblongs $\frac{1}{6}$, $\frac{1}{3}$, $\frac{1}{2}$, $\frac{2}{3}$, and $\frac{5}{6}$ as long.

ORAL EXERCISE

1. Draw on the blackboard a line 1 foot long and divide it into thirds. Divide each third into halves. Then

$\frac{1}{6}$ is what part of $\frac{1}{3}$? $\frac{2}{3}$ are how many sixths?

2. Point to $\frac{1}{3}$ of the line. What is $\frac{1}{2}$ of $\frac{1}{3}$ of the line?

3. How many sixths of a foot are there in $\frac{1}{3}$ of a foot? in $\frac{2}{3}$ of a foot? in $\frac{1}{2}$ of a foot?

4. How many sixths are there in 2? in $2\frac{1}{6}$ (2 and $\frac{1}{6}$)?

5. How many sixths are $\frac{6}{6} - \frac{1}{6}$? $1 - \frac{1}{6}$? $\frac{6}{6} - \frac{1}{3}$? $1 - \frac{1}{3}$? $1 - \frac{5}{6}$? $1 - \frac{4}{6}$? $1 - \frac{2}{3}$? $1 - \frac{3}{6}$? $1 - \frac{1}{2}$?

ORAL EXERCISE

1. Draw a line 1 ft. long. Divide it into halves. How many inches are there in $\frac{1}{2}$ of a foot?

2. Divide the line into fourths. How many inches are there in $\frac{1}{4}$ of a foot? in $\frac{3}{4}$ of a foot?
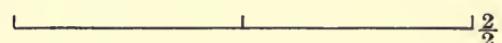
3. How many fourths of a foot are there in $\frac{1}{2}$ of a foot?
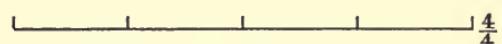
4. Divide the line into thirds. How many inches in $\frac{1}{3}$ of a foot? in $\frac{2}{3}$ of a foot?

5. Divide the line into sixths. How many inches are there in $\frac{1}{6}$ of a foot? in $\frac{5}{6}$ of a foot? in $\frac{4}{6}$ of a foot?

6. How many sixths are there in $\frac{1}{3}$? in $\frac{2}{3}$? in $\frac{3}{3}$?

7. Draw a line 10 inches long and divide it into fifths. Divide it into tenths. How many tenths are there in $\frac{2}{5}$?

IX. GENERAL REVIEW

WRITTEN EXERCISE

Add the following :

1. 123	183	189	286	474	239
472	472	472	493	298	348
2. 392	286	758	538	398	456
489	509	177	269	477	481
3. 287	568	429	377	522	277
387	296	492	478	398	643
4. 249	287	488	526	485	298
393	573	296	375	275	437

Subtract the following :

5. 586	526	581	521	562	691
231	231	236	236	375	493
6. 428	532	631	741	921	907
169	274	227	268	329	659
7. 722	653	917	642	753	811
434	346	289	485	368	298
8. 654	716	723	820	620	923
278	257	334	216	325	475
9. 500	600	632	704	800	710
417	522	333	650	488	296

Multiply the following:

10.	25	33	14	24	30	33
	2	2	2	3	3	3

11.	41	23	40	32	43	27
	3	4	4	4	5	5

12.	22	31	21	42	20	59
	5	5	6	6	6	2

13.	34	44	33	50	45	76
	7	7	8	8	9	3

14. If there are 23 pupils in each of 4 classes, how many pupils are there in all?

15. If one pupil's desk costs a school $3, how much will 24 desks cost the school?

Remember that $24 \times 3 = 3 \times 24$.

Multiply each of the numbers 4, 7, 8, 3, 5, 9, 6, 2, in turn:

16. By 3, and add 2 to the product.

17. By 4, and add 3 or 2 to the product.

18. By 5, and add 4, 3, or 2 to the product.

The teacher should direct the number to be added each time. The numbers to be multiplied should be written on the blackboard.

Divide the following:

19. By 2:	32	42	52	62	73	75
20. By 3:	51	57	69	75	80	91
21. By 4:	48	56	72	81	87	93
22. By 5:	65	75	72	83	95	99

X. USING WHAT YOU HAVE LEARNED

HOW THE COUNTRY BOY AND GIRL USE THEIR ARITHMETIC

1. Frank's father has an orchard with 5 rows of apple trees, 17 trees in each row. How many trees are there?

2. Frank picked 2 bushels of apples from each of the 17 apple trees. How many bushels did he pick in all?
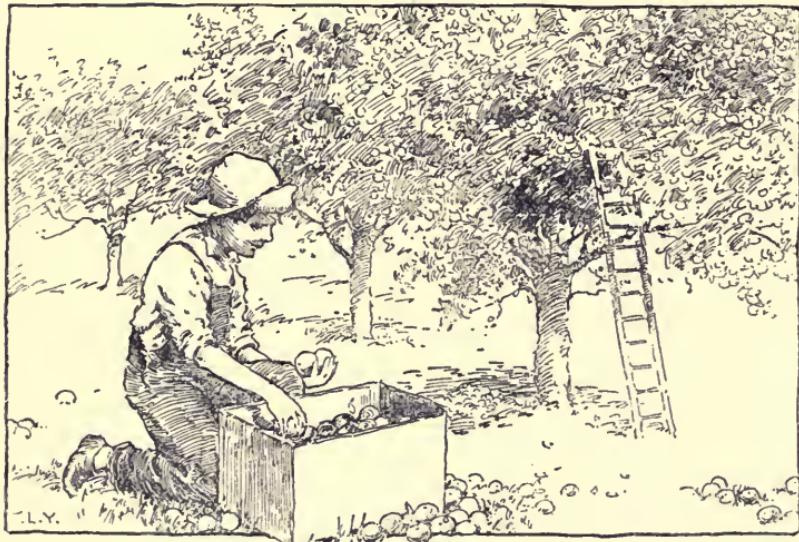
3. Frank's father sold 2 bushels of apples at 45¢ a bushel. How much did he receive for these apples?

4. He paid Frank 5¢ a bushel for picking apples. After picking 15 bushels how much money had Frank earned?

5. If Frank's father gave him 4 hens, and Spot laid 7 eggs, Black Foot 6 eggs, Fussy 8 eggs, and Browny 9 eggs, how many eggs did they all lay?

6. After Frank had 3 dozen eggs he sold them for 28¢ a dozen. How much money did he receive?

7. If Frank has 62¢ and it costs him 25¢ to get into the fair, how much does he have after buying his ticket?

8. Has Frank money enough left (see Ex. 7) to take his sister to the fair? If so, how much would he have left?

9. Mary learned to milk the cows. Her father paid her by giving her the milk from one of the cows. This cow gave 14 qt. of milk a day, and Mary sold this to a neighbor at 5¢ a quart. How much did Mary earn a day?

10. If Mary saves 16¢ a week, how much money does she save in 5 weeks?

11. Mary is saving money for a concert. She wishes to take her aunt and cousin. Her aunt's ticket will cost 50¢, and the tickets for her cousin and herself will cost 25¢ each. How much must she save for all three tickets?

12. If Mary picks 14 qt. of berries and sells them for 3¢ a quart, how much money does she receive?

13. Mary's mother sends her to town with her father, and tells her to buy 4 yd. of calico. Mary finds that she must pay 13¢ a yard for the kind she needs. How much will it cost?

14. If Mary owes the storekeeper 52¢ and gives him a dollar, how much change does she receive?

15. Mary's father buys a mowing machine for $65. He pays $48 down and asks Mary if she can tell how much more he must pay. What should she tell him?

16. Frank and his cousin made a snow fort. They rolled 6 snowballs for the lowest row, 6 for the next, and 6 for the top row. How many snow-balls did they use for the front of the fort?

17. For each of the two sides they used 2 snowballs in each row. How many snowballs did they use on each side? How many did they use on both sides? How many did they use for the whole fort?

18. For the snow fight Frank made 4 doz. snowballs, and his cousin made 3 doz. How many snowballs did each make? How many did they make together?

19. Frank coasted on his sled 428 ft., and his cousin coasted 35 ft. farther. How far did his cousin coast?

20. Frank spent 5 min. in fixing his skates, and skated 25 min. Then he stopped 6 min. to fix his skates again. He skated 18 min. more and then went home. How many minutes was he skating and fixing his skates?

Omit Exs. 16-20 if the subjects are not familiar to the pupils.

21. Frank's father drove to town on Monday with 16 bushels of potatoes. On Tuesday he drove in with 18 bushels, and on Wednesday with 14 bushels. How many bushels did he take to town on these three days?

22. Frank lives 4 miles from town. How many miles does his father drive in going to town and back? How many miles did he drive in the three days?

ORAL TIME TEST IN MULTIPLICATION

State the following products:

1. 4×5.	6. 3×3.	11. 9×5.	16. 9×4.
2. 7×3.	7. 5×4.	12. 4×3.	17. 8×5.
3. 8×2.	8. 6×5.	13. 6×2.	18. 3×2.
4. 6×4.	9. 7×2.	14. 3×4.	19. 7×5.
5. 5×5.	10. 9×2.	15. 8×4.	20. 8×3.

State the results of the following:

21. $6 \times 3 + 2$.	24. $5 \times 2 + 1$.	27. $3 \times 4 + 1$.
22. $9 \times 2 + 1$.	25. $2 \times 5 + 1$.	28. $4 \times 4 + 3$.
23. $3 \times 5 + 2$.	26. $8 \times 3 + 2$.	29. $9 \times 5 + 4$.

The results of these 29 examples should be stated in 2 minutes or less.

ORAL TIME TEST IN DIVISION

State the following quotients:

1. $9 \div 3$.	10. $4 \div 4$.	19. $3 \div 3$.	28. $6 \div 3$.
2. $5 \div 5$.	11. $4 \div 2$.	20. $6 \div 2$.	29. $2 \div 2$.
3. $6 \div 1$.	12. $16 \div 4$.	21. $21 \div 3$.	30. $8 \div 4$.
4. $18 \div 3$.	13. $35 \div 5$.	22. $16 \div 2$.	31. $18 \div 2$.
5. $20 \div 2$.	14. $24 \div 3$.	23. $30 \div 5$.	32. $20 \div 4$.
6. $50 \div 5$.	15. $32 \div 4$.	24. $24 \div 4$.	33. $28 \div 4$..
7. $45 \div 5$.	16. $20 \div 5$.	25. $25 \div 5$.	34. $10 \div 1$.
8. $36 \div 4$.	17. $15 \div 3$.	26. $10 \div 5$.	35. $12 \div 4$.
9. $27 \div 3$.	18. $12 \div 3$.	27. $30 \div 3$.	36. $10 \div 2$.

The results of these 36 examples should be stated in $1\frac{1}{2}$ minutes or less.
EP

XI. LITTLE EXAMINATIONS

I.
1. $9 + 37.$
2. $50 - 4.$
3. $XI = (?).$
4. $5 \times 4 + 2.$
5. $28 \div 4.$
6. $3 \times 42.$
7. $7 \times 32.$
8. $56 \div 4.$
9. $\frac{1}{3}$ of $636.$
10. $\frac{1}{4}$ of $364.$
11. $5 \text{ qt.} = (?) \text{ pt.}$
12. $8 \text{ pt.} = (?) \text{ qt.}$

II.
1. $7 + 45.$
2. $45 - 7.$
3. $IX = (?).$
4. $7 \times 3 + 6.$
5. $24 \div 3.$
6. $24 \div 4.$
7. $3 \times 24.$
8. $8 \times 24.$
9. $\frac{1}{2}$ of $36.$
10. $\frac{1}{3}$ of $36.$
11. $\frac{1}{4}$ of $360.$
12. $3 \text{ ft.} = (?) \text{ in.}$

III.
1. $8 + 56.$
2. $56 - 8.$
3. $VIII = (?).$
4. $5 \times 2 + 4.$
5. $36 \div 4.$
6. $30 \div 3.$
7. $4 \times 36.$
8. $4 \times 63.$
9. $\frac{1}{2}$ of $72.$
10. $\frac{1}{3}$ of $72.$
11. $\frac{1}{4}$ of $72.$
12. $2 \text{ yd.} = (?) \text{ ft.}$

IV.
1. $6 + 49.$
2. $52 - 7.$
3. $VII = (?).$
4. $9 \times 4 + 7.$
5. $32 \div 4.$
6. $27 \div 3.$
7. $4 \times 32.$
8. $8 \times 32.$
9. $\frac{1}{2}$ of $32.$
10. $\frac{1}{3}$ of $312.$
11. $\frac{1}{4}$ of $324.$
12. $6 \text{ ft.} = (?) \text{ yd.}$

V.
1. $7 + 58.$
2. $57 - 8.$
3. $2 \times 57.$
4. $3 \times 57.$
5. $240 \div 4.$
6. $240 \div 2.$
7. $240 \div 3.$
8. $2 \times 240.$
9. $\frac{1}{2}$ of $124.$
10. $\frac{1}{4}$ of $124.$
11. $\frac{1}{3}$ of $123.$
12. $1 \text{ yd.} = (?) \text{ in.}$

These Little Examinations at the close of each chapter furnish excellent review drill work. The time should be recorded for each, and the pupils should endeavor to improve their records.

CHAPTER III

I. READING AND WRITING NUMBERS

$$2000 \quad + \quad 300 \quad + \quad 40 + 2$$
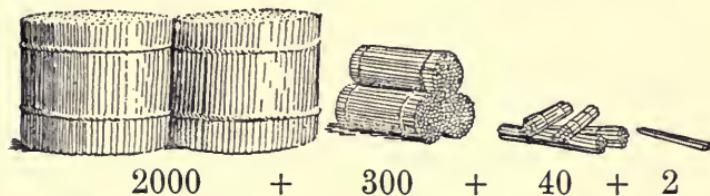
ORAL EXERCISE

1. Ten 100's make *one thousand*, 1000. Count by 1000's from 1000 to 10,000.

2. How many splints are there in the picture? Write the number on the blackboard.

3. We read 2000 thus: "Two thousand." How do we read 3000?

4. We read 2200 thus: "Two thousand two hundred," or "twenty-two hundred." How do we read 3200? How do we read 4800?

5. We read 2004 thus: "Two thousand four." How do we read 3007? 3047? 3147? 5247?

6. Read the following numbers:

| 27 | 270 | 2700 | 271 | 2710 | 2713 |
| 35 | 350 | 3500 | 356 | 3560 | 3567 |

ORAL EXERCISE

Read the following numbers :

1. 1000.	**11.** 3000.	**21.** 5000.	**31.** 7000.
2. 1200.	**12.** 3600.	**22.** 5005.	**32.** 7500.
3. 1230.	**13.** 3670.	**23.** 5050.	**33.** 7596.
4. 1235.	**14.** 3678.	**24.** 5055.	**34.** 8596.
5. 1435.	**15.** 3996.	**25.** 6000.	**35.** 8798.
6. 2000.	**16.** 4000.	**26.** 6600.	**36.** 9256.
7. 2400.	**17.** 4040.	**27.** 6606.	**37.** 9398.
8. 2460.	**18.** 4004.	**28.** 6666.	**38.** 9872.
9. 2465.	**19.** 4044.	**29.** 6756.	**39.** 9981.
10. 2578.	**20.** 4444.	**30.** 6897.	**40.** 9999.

WRITTEN EXERCISE

Write in figures :

1. One hundred one; two hundred seven.
2. One thousand one; five thousand four.
3. Two thousand one hundred one.
4. Three thousand two hundred seven.
5. Three thousand four hundred seventeen.
6. Four thousand seven hundred sixty-five.
7. Five thousand five hundred fifty-five.
8. Six thousand eight hundred nineteen.
9. Seven thousand eight hundred ninety.
10. Nine thousand nine hundred ninety-nine.
11. Three thousand three hundred thirty-three.

ORAL EXERCISE

1. Read these numbers, which are found on the clock face:

III   IX   XII   I   VII   IV   XI   V   X   VI

2. Tell the time when the minute hand points to XII and the hour hand points to IX; to XI; to II; to X; to XII; to IIII; to I; to VI; to VII.

Use of Roman Numerals. The Roman numerals are often used for numbering the chapters of books.

1 to 5:	I	II	III	IV	V
6 to 10:	VI	VII	VIII	IX	X
11 to 15:	XI	XII	XIII	XIV	XV
16 to 20:	XVI	XVII	XVIII	XIX	XX

---

3. When you come to Chapter XIV in a book, how many chapters have you read?

4. When you have read Chapter IX of a book and the last chapter is XV, how many chapters have you to read?

WRITTEN EXERCISE

1. Write in Roman numerals:

15   8   11   17   13   9   5   10   14

2. Write in our ordinary numerals:

XI   IX   XIX   XIV   XVII   VII   XVIII

3. Write the number of years of your age, both in ordinary numerals and in Roman numerals.

ORAL EXERCISE

1. These children are playing store. Jack buys 20¢ worth of candy and gives a quarter of a dollar. How much change is due?

2. Fanny buys 10¢ worth of bananas at 2 for a nickel. She buys how many bananas?

3. The dealer says that oranges are sold at 3 for a dime. How much will half a dozen oranges cost?

4. At 4¢ each, how much will 3 oranges cost Fanny?

Writing Money. In writing dollars and cents we write

$2.50 for 2 dollars and 50 cents,

$15.05 for 15 dollars and 5 cents,

and $0.75, $.75, or 75¢ for 75 cents.

Write first the dollar sign ($), then the number of dollars, then a period (decimal point), and then the number of cents.

Both $0.75 and $.75 are correct forms for 75 cents. When written by itself, $0.75 is the safer, for the decimal point in $.75 is easily overlooked; but when written in a column, as in addition, there is no need for the 0.

The teacher should also allow such forms as 75 ct. and 75 c. instead of 75¢, because they are in common use and the pupils should know them.

The pupils should be told that in addition and subtraction the dollar sign ($) is written only before the top number and before the result.

Read the following :

1. $1.25.	9. $19.05.	17. $231.00.	25. $219.36.
2. $2.07.	10. $21.00.	18. $217.81.	26. $246.95.
3. $3.00.	11. $32.01.	19. $329.75.	27. $318.86.
4. $5.75.	12. $75.56.	20. $831.08.	28. $981.99.
5. $4.00.	13. $65.00.	21. $106.75.	29. $152.50.
6. $5.65.	14. $46.73.	22. $415.50.	30. $524.25.
7. $5.50.	15. $36.75.	23. $142.80.	31. $157.90.
8. $7.00.	16. $40.02.	24. $300.75.	32. $423.86.

Write in figures, with the proper signs for money :

1. 4 dollars	1 dollar and 75 cents
2. 16 dollars	3 dollars and 3 cents
3. 14 dollars	7 dollars and 25 cents
4. 18 dollars	16 dollars and 80 cents
5. 230 dollars	175 dollars and 75 cents
6. 100 dollars	248 dollars and 49 cents
7. 184 dollars	250 dollars and 49 cents
8. 200 dollars	500 dollars and 50 cents
9. 300 dollars	750 dollars and 85 cents
10. 400 dollars	286 dollars and 98 cents

11. Seven hundred sixty-eight dollars.

12. One hundred fifty dollars and ten cents.

13. Two hundred seventy-five dollars and ten cents.

II. ADDITION

Adding Long Columns. In adding long columns we may write the sum of each column separately. Business men often do this. We may add *up* the first time, and check the result by adding *down*.

When you look at two figures, always think of the *sum* of the two numbers. Instead of saying " 3 and 4 are 7," simply look at 3 and 4 and think " 7."

When you look at the ones' column you should see the two 10's $(3 + 5 + 2$, and $7 + 3)$ at once, and you should see that the sum is two 10's and 6, or 26.

Add rapidly; if you do so, you will usually make fewer mistakes.

$$\begin{array}{c} 76 \\ 83 \\ 67 \\ 92 \\ 55 \\ \underline{43} \\ \overline{26} \\ 39 \\ \overline{416} \text{ sum} \end{array}$$

Uniting two or more numbers, called *addends*, so as to make a single number is called *addition*.

The teacher should explain that the sign $, written before the first addend in a column, applies to all addends in the column.

WRITTEN EXERCISE

Add the following :

1.	2.	3.	4.	5.	6.	7.
42	52	29	52	48	$39	$24
28	33	71	73	78	27	36
41	48	36	81	32	53	42
79	48	64	64	52	66	33
16	67	82	75	26	53	25

ORAL EXERCISE

*Add from the bottom to the top, group when possible, and
check the work by adding from the top to the bottom :*

1.	2.	3.	4.	5.	6.	7.	8.	9.
2	2	8	8	8	2	8	3	2
4	3	7	3	2	3	3	8	4
6	7	3	8	5	4	6	2	8
5	6	·4	2	5	7	9	6	3
7	5	9	9	7	6	8	9	9
9	8	6	3	3	2	7	8	6

These are types of problems to be written on the board for rapid drill work.

WRITTEN EXERCISE

Add, checking the work as stated above :

1.	2.	3.	4.	5.
23	89	37	85	81
48	64	40	23	72
72	73	29	40	35
69	29	82	27	86
43	82	76	82	92

6.	7.	8.	9.	10.
128	834	823	828	348
932	281	204	926	492
486	342	896	349	687
529	907	480	877	402
348	602	320	492	374
726	270	981	681	200

1. George works after school for Mr. Forbes, the grocer. Mr. Forbes set him at work sorting oranges. George found 196 good oranges in one box and 188 in another box. How many good oranges did he find in both boxes?

2. Mr. Forbes had George take the cans of fruit from the shelves so as to count them. He counted 97 cans of peaches, 86 cans of pears, and 47 cans of plums. How many cans were there of all three kinds?

3. George arranged some cakes of soap on the shelves. There were 127 cakes of one kind, 246 of another, and 144 of another. How many cakes of soap were there?

4. George polished the eating apples so that they would sell better. He polished 98 apples of one kind, 139 of another, and 74 of another. How many apples did he polish?

5. Mr. Forbes paid George 15¢ on Monday, 15¢ on Tuesday, 18¢ on Wednesday, 20¢ on Thursday, 15¢ on Friday, and 25¢ on Saturday. How many cents did he pay him that week?

6. Mr. Forbes put $25 in the bank on Monday, $35 on Tuesday, $30 on Wednesday, $36 on Thursday, $45 on Friday, and $48 on Saturday. How much money did he put in the bank that week?

7. Mr. Forbes spent $35 one day and $18 another day. How much money did he spend altogether?

8. If Mr. Forbes had $250 in the bank, and then put in $75 more, and then drew out $25, how much money was left in the bank?

WRITTEN EXERCISE

Add, timing yourself:

1.	2.	3.	4.	5.
$217	246	276	329	$437
343	434	427	286	293

6.	7.	8.	9.	10.
$127	142	326	463	$123
246	237	293	298	247
329	421	147	127	409

11.	12.	13.	14.	15.
106	213	106	132	222
287	129	219	167	333
109	308	137	207	111

16.	17.	18.	19.	20.
121	106	217	272	319
42	92	102	129	107
37	37	69	106	28
168	15	72	43	63

21.	22.	23.	24.	25.
$136	$127	$147	$192	$400
42	38	29	37	125
81	25	108	91	30
92	172	32	82	19
237	81	129	263	16
148	69	70	109	128

Addition of Money. Ruth put $2.70 in her bank in one month, $3.65 the next month, and $0.38 the first week of the following month. How much did she put in the bank in all?

We see that we must add $2.70, $3.65, and $0.38.

We first write the numbers so that the decimal points are under one another.

$2.70
3.65
.38
——
$6.73

Then 8 cents + 5 cents = 13 cents = 1 dime + 3 cents. We write the 3 in the cents' column and add the 1 to the dimes.

Then 1 dime + 3 dimes + 6 dimes + 7 dimes = 17 dimes = $1 + 7 dimes. We write the 7 in the dimes' column and add the 1 to the dollars.

Then $1 + $3 + $2 = $6. We write the 6 in the dollars' column and put the decimal point under the decimal points.

The sum is $6.73, so Ruth has put $6.73 in her bank.

WRITTEN EXERCISE

Add the following, and check the work:

1.	2.	3.	4.	5.
$4.83	$4.89	$5.90	$5.96	$8.92
5.64	5.66	2.75	2.78	5.78

6.	7.	8.	9.	10.
$1.27	$6.92	$8.75	$9.22	$8.37
3.87	5.23	5.68	.76	.98
.25	.35	1.27	2.60	3.00

WRITTEN EXERCISE

1. Robert helps in a grocery after school, and the grocer sometimes sets him at work to add the bills. Mrs. James has bought groceries costing $1.30, $1.20, $0.65, and $0.96. Robert adds these amounts. What is their sum?

2. Robert finds that Mrs. Monroe has bought groceries costing $2.25, $1.60, $0.75, $1.32, $0.65, and $1.18. How much does she owe?

The grocer gives Robert bills with the following items to add. Find the sum of each:

3.	4.	5.	6.	7.
$1.42	$5.20	$2.19	$1.44	$3.20
.36	3.60	3.16	3.00	1.40
.48	4.32	.42	1.36	.39
.27	.68	3.27	.42	1.86
3.62	.49	1.68	1.07	.42

Robert finds that the bills are usually ruled, so that he does not have to write the dollar sign or the decimal point. He finds that the columns look like this. Add each bill:

8.		9.		10.		11.		12.	
2	10	3	15		42	1	00		38
	32	1	06	3	00	3	68		46
	48		72		68		49		98
1	06		39		71		76	2	96
	73		87		96		98		43

III. SUBTRACTION

WRITTEN EXERCISE

Subtract, timing yourself and checking the work :

1.	2.	3.	4.	5.	6.
236	342	409	527	400	326
129	273	263	329	192	178

7.	8.	9.	10.	11.	12.
409	600	725	908	752	360
237	482	536	809	429	290

13.	14.	15.	16.	17.	18.
728	342	801	712	801	902
299	139	236	348	296	327

19.	20.	21.	22.	23.	24.
711	628	$426	$304	$322	$209
344	439	278	265	148	168

25.	26.	27.	28.	29.	30.
$387	$400	$925	$305	$492	$286
296	275	560	197	137	192

31.	32.	33.	34.	35.	36.
$840	$927	$209	$325	$430	$535
726	109	110	186	345	287

37.	38.	39.	40.	41.	42.
$415	$523	$816	$927	$862	$900
236	475	536	349	468	521

Making Change. If you owe the grocer 35¢ and give him a 50-cent piece, he makes change by finding the amount which, added to 35¢, makes 50¢. He does this by saying, "35 and **5** are 40, and **10** are 50," taking up 5¢ and 10¢ as he says this. He then gives you 15¢.

If the school is provided with toy money it should be used at this time. The drill is valuable without this, however, for this is exactly the kind of work that we have to do mentally when we make purchases.

ORAL EXERCISE

1. Make change for 50¢, when you owe:

| 25¢ | 30¢ | 40¢ | 45¢ | 29¢ | 31¢ |

2. Make change for 25¢, when you owe:

| 20¢ | 22¢ | 18¢ | 15¢ | 9¢ | 19¢ |

3. Make change for 75¢, when you owe:

| 72¢ | 62¢ | 58¢ | 69¢ | 57¢ | 67¢ |

4. Make change for $1, when you owe:

| 95¢ | 85¢ | 68¢ | 52¢ | 36¢ | 91¢ |
| 75¢ | 80¢ | 55¢ | 65¢ | 20¢ | 25¢ |

5. Mary buys some ribbon for 18¢ and gives the dealer 25¢. How much change is due?

6. Rob buys a ball for 65¢ and gives the dealer $1. How much change is due?

7. Harriet buys some cloth for $1.20. She gives the dealer a 2-dollar bill. How much change is due?

Subtraction of Money. If Mr. Brown has $247.50 and spends $176.75 of it for some cattle, how much money has he left?

We see that we must subtract $176.75 from $247.50.

$$\begin{array}{r} \$247.50 \\ 176.75 \\ \hline \$70.75 \end{array}$$

We write the numbers as here shown.

$10 - 5 = 5$. We write the 5 under cents.

$14 - 7 = 7$. We write the 7 under the dimes.

We now write the decimal point.

$6 - 6 = 0$. We write the 0 under the dollars.

$14 - 7 = 7$. We write the 7 under the tens of dollars.

$1 - 1 = 0$, so there are no hundreds of dollars.

The result is $70.75, and so Mr. Brown has $70.75 left.

In subtracting United States money, write the numbers so that the decimal points are in a column and subtract in the usual way.

WRITTEN EXERCISE

Subtract, and check the work:

1.	2.	3.	4.
$72.41	$29.84	$94.76	$60.70
24.92	12.97	76.98	55.81

5.	6.	7.	8.
$50.01	$65.42	$90.08	$52.86
20.09	59.97	25.19	23.94

9.	10.	11.	12.
$341.65	$341.65	$341.65	$341.65
120.40	170.40	170.46	173.46

ORAL EXERCISE

Subtract the following :

1.	2.	3.	4.	5.
$3.60	$3.09	$3.69	$3.65	$5.75
.10	.04	.14	1.14	2.14

6.	7.	8.	9.	10.
$5.95	$4.65	$5.55	$8.75	$8.96
1.20	1.10	4.44	.25	1.96

WRITTEN EXERCISE

Subtract, check the work, and time yourself :

1.	2.	3.	4.	5.
$76.29	$85.36	$76.29	$14.36	$70.24
75.37	6.87	62.89	5.63	10.65

6.	7.	8.	9.	10.
$96.73	$88.41	$95.27	$33.42	$47.63
77.96	79.52	9.86	9.29	8.24

11.	12.	13.	14.	15.
$26.96	$60.00	$21.40	$40.00	$90.00
17.27	42.36	17.52	5.75	36.27

16.	17.	18.	19.	20.
$24.00	$32.09	$41.32	$68.03	$75.00
.78	16.70	28.75	49.26	.69

EP

IV. MULTIPLICATION AND DIVISION

ORAL EXERCISE

1. Minnie helps her mother make and care for the flower garden at their home. Minnie has planted some violets, 6 plants in each row. How many plants has she in 2 rows?

2. But Minnie has more than 2 rows of plants; she has 4 rows. How do you find the number of plants in 4 rows? How many plants are there?

3. If Minnie sets out 2 more rows, she will have 6 rows in all. There are 6 plants in each row. How do you find the number of plants in all 6 rows?

4. How much is $6 + 6$? How much is $6 + 6 + 6$? How much is $6 + 6 + 6 + 6$? Which is easier, to add these, or to find the answers by multiplying?

5. How much is $6 + 6$? $12 + 6$? $18 + 6$? $24 + 6$? Count by 6's from 6 to 30.

6. If Minnie sets out another row of violets, she will have 7 rows, and there will be 6 plants in each row. How do you find the number of plants in all? Is it easier to add $6 + 6 + 6 + 6 + 6 + 6 + 6$, or to know without adding how many seven 6's are? Do you know how much 7×6 is? If you do not know, how can you find out?

The pupil is now about to begin the second half of the multiplication tables. By simple examples like those above he should be led to see the advantage of learning the tables. He should see that, although he could find his results by adding, it is much easier and quicker to use the multiplication tables.

1. Add the columns of 6's, from one 6 to five 6's.

2. On the blackboard and on paper build more columns of 6's, until you have ten 6's in the last column. How many columns are there?

3. Read the columns, thus: "One 6 is 6, two 6's are 12, three 6's are 18," and so on.

4. How many are five 6's? six 6's? seven 6's? eight 6's? nine 6's? ten 6's?

				6
			6	6
		6	6	6
	6	6	6	6
6	6	6	6	6

5. Read and learn this table of 6's, thus: "Two 6's are 12," or "two times 6 are 12," and so on:

$2 \times 6 = 12$	$5 \times 6 = 30$	$8 \times 6 = 48$
$3 \times 6 = 18$	$6 \times 6 = 36$	$9 \times 6 = 54$
$4 \times 6 = 24$	$7 \times 6 = 42$	$10 \times 6 = 60$

6. How much is 1×6? 6×1? 6×0? 0×6?

7. How much is $6 + 6 + 6$? 3×6?

8. How much is $6 + 6 + 6 + 6 + 6$? 5×6?

9. State the values of the following:

$2 \times 6 + 1$	$3 \times 6 + 2$	$5 \times 6 + 1$
$3 \times 6 + 1$	$4 \times 6 + 3$	$5 \times 6 + 2$

10. State rapidly the following products:

6×1	6×8	6×4	6×3
6×5	6×7	6×2	6×9
1×6	8×6	4×6	9×6
5×6	7×6	2×6	0×6

One-Figure Multiplier. A dealer bought 6 automobiles. Including freight, they cost him $807 each. How much did they all cost?

We see that they all cost $6 \times \$807$.

6×7 ones $= 42$ ones $= 4$ tens $+ 2$ ones. We write the 2 in the ones' place and add the 4 to the tens.

$$\begin{array}{r} \$807 \\ 6 \\ \hline \$4842 \end{array}$$

6×0 tens $= 0$ tens; but we have 4 tens already from the 42, so we write the 4 in the tens' place.

6×8 hundreds $= 48$ hundreds $= 4$ thousands $+ 8$ hundreds. We write the 8 in the hundreds' place, and the 4 in the thousands' place.

The product is 4842, and so the automobiles cost $4842.

Teachers should note that the tables thus far learned are sufficient for any multiplication or any division in which either factor is less than 6.

WRITTEN EXERCISE

1. How many " week days " are there in 31 weeks?

2. At $6 ¢$ a pound, how much will 21 lb. of sugar cost?

3. At $6 apiece, how much will 30 lamps cost?

Multiply the following :

4.	5.	6.	7.	8.	9.
201	301	501	401	901	701
6	6	6	6	6	6

Copy and complete the following :

10. $5 \times 6 + 3 =$ $9 \times 6 + 4 =$ $6 \times 6 + 4 =$

11. $7 \times 6 + 6 =$ $8 \times 6 + 3 =$ $3 \times 6 + 2 =$

Multiplication Continued. We multiply 325 by 6 thus:

6 × 5 ones = 30 ones, or 3 tens and 0 ones. We write the 0 in the ones' place and add the 3 tens to the next product.

6 × 2 tens = 12 tens, and 12 tens + 3 tens = 15 tens, or 1 hundred and 5 tens. We write the 5 in the tens' place and add the 1 hundred to the next product.

```
 325
   6
1950
```

6 × 3 hundreds = 18 hundreds, and we know that 18 hundreds + 1 hundred = 19 hundreds, or 1 thousand and 9 hundreds. We write the 9 in the hundreds' place and the 1 in the thousands' place.

The product is 1950.

WRITTEN EXERCISE

Multiply the following:

1.	2.	3.	4.	5.	6.
120	125	234	325	425	275
2	2	2	2	2	2

7.	8.	9.	10.	11.	12.
320	321	325	343	446	453
3	3	3	3	3	3

13.	14.	15.	16.	17.	18.
206	216	265	236	326	525
4	5	6	7	8	9

19.	20.	21.	22.	23.	24.
406	461	416	466	566	728
5	5	5	7	8	3

ORAL EXERCISE

1. How many 6's are there in 6 ? in 12 ? in 18 ? in 42 ?

2. State rapidly the results:

$54 \div 6$ $\qquad$ $30 \div 6$ $\qquad$ $48 \div 6$ $\qquad$ $36 \div 6$

3. Read and learn this table:

$12 \div 6 = 2$	$30 \div 6 = 5$	$48 \div 6 = \ 8$
$18 \div 6 = 3$	$36 \div 6 = 6$	$54 \div 6 = \ 9$
$24 \div 6 = 4$	$42 \div 6 = 7$	$60 \div 6 = 10$

4. State rapidly the results:

5×6	7×6	$54 \div 6$	3×6
6×5	6×7	$54 \div 9$	$18 \div 6$
$30 \div 6$	$42 \div 6$	$48 \div 6$	6×6
$30 \div 5$	$42 \div 7$	8×6	$36 \div 6$

WRITTEN EXERCISE

1. At 6ϕ a pound, how many pounds of sugar can you buy for 48ϕ? for 54ϕ? for 60ϕ?

2. At 6ϕ a box, how many boxes of crackers can you buy for 54ϕ? for 36ϕ? for 42ϕ?

3. At 6ϕ a yard, how many yards of cloth can you buy for 24ϕ? for 30ϕ? for 66ϕ?

4. If the pupils of a class of 30 march in rows of 6, how many rows are there?

5. Copy and complete:

$36 \div \quad = 6$ $\qquad$ $\div 6 = 3$ $\qquad$ $30 \div 6 =$

Further Work in Division. We have already learned
how to divide by a number of one figure, and we shall
now consider the reasons more fully. For example, to
divide 628 by 2 we write the numbers as
here shown.

$$\begin{array}{r} 2\,)\,628 \\ \hline 314 \end{array}$$

We see that 6 hundreds ÷ 2 = 3 hundreds,
and we write the 3 in the hundreds' place,
below the dividend.

Then 2 tens ÷ 2 = 1 ten, and we write the 1 in the tens'
place, below the dividend.

Then 8 ones ÷ 2 = 4 ones, and we write the 4 in the ones'
place, below the dividend.

The quotient is 314.

<div style="text-align:center">WRITTEN EXERCISE</div>

Divide the following :

1. 648 ÷ 2.	9. 846 ÷ 2.	17. 468 ÷ 2.
2. 639 ÷ 3.	10. 693 ÷ 3.	18. 936 ÷ 3.
3. 444 ÷ 4.	11. 448 ÷ 4.	19. 840 ÷ 4.
4. 884 ÷ 4.	12. 848 ÷ 4.	20. 888 ÷ 8.
5. 555 ÷ 5.	13. 550 ÷ 5.	21. 505 ÷ 5.
6. 666 ÷ 6.	14. 660 ÷ 6.	22. 868 ÷ 2.
7. 600 ÷ 6.	15. 500 ÷ 5.	23. 777 ÷ 7.
8. 448 ÷ 2.	16. 336 ÷ 3.	24. 999 ÷ 9.

25. A man paid $360 for some lambs at $3 each. How
many lambs did he buy?

26. A dealer paid $408 for some coats at $4 each. How
many coats did he buy?

1. Add the columns of 7's, from one 7 to five 7's.

2. On the blackboard and on paper build more columns of 7's, until you have ten 7's in the last column. How many columns are there?

3. Read the columns, thus : " One 7 is 7, two 7's are 14," and so on.

4. How many are five 7's? six 7's? seven 7's? eight 7's? nine 7's? ten 7's?

```
                7
             7  7
          7  7  7
       7  7  7  7
    7  7  7  7  7
    ─  ─  ─  ─  ─
```

5. Read and learn this table of 7's :

$2 \times 7 = 14$	$5 \times 7 = 35$	$8 \times 7 = 56$
$3 \times 7 = 21$	$6 \times 7 = 42$	$9 \times 7 = 63$
$4 \times 7 = 28$	$7 \times 7 = 49$	$10 \times 7 = 70$

6. How much is 1×7? 7×1? 7×0? 0×7?

7. How much is $7 + 7 + 7 + 7 + 7 + 7$? What short way is there of finding the answer?

8. State rapidly the following products :

3×7	7×6	7×9	7×5
7×3	9×7	7×0	0×7
4×7	7×7	7×2	2×7
7×4	7×8	7×1	5×7

9. What is the cost of 6 tables at $7 each?

10. What is the cost of 7 desks at $3 each, and a teacher's desk at $7?

11. What is the cost of 9 yd. of calico at $7 ¢$ a yard? of 2 yd. of trimming at $7 ¢$ a yard?

ORAL EXERCISE

1. Recite the table of 7's from 1×7 to 10×7.

2. At 7¢ a yard, what will 8 yd. of ribbon cost?

3. At 7¢ a pound, what will 9 lb. of sugar cost?

State these products :

4. 4×7.	**8.** 8×7.	**12.** 6×7.	**16.** 2×7.
5. 9×7.	**9.** 7×7.	**13.** 7×1.	**17.** 1×7.
6. 7×3.	**10.** 3×7.	**14.** 5×7.	**18.** 0×7.
7. 7×2.	**11.** 7×5.	**15.** 10×7.	**19.** 7×4.

State the answers :

20. $6 \times 7 + 4$.	**23.** $2 \times 7 + 1$.	**26.** $8 \times 7 + 5$.
21. $6 \times 7 + 6$.	**24.** $9 \times 7 + 5$.	**27.** $9 \times 7 + 2$.
22. $4 \times 7 + 3$.	**25.** $5 \times 7 + 2$.	**28.** $7 \times 7 + 3$.

WRITTEN EXERCISE

Multiply the following :

1.	**2.**	**3.**	**4.**	**5.**	**6.**
101	102	112	132	335	227
7	7	7	7	7	7

7.	**8.**	**9.**	**10.**	**11.**	**12.**
200	204	224	324	368	362
7	7	7	7	7	7

13.	**14.**	**15.**	**16.**	**17.**	**18.**
400	409	419	439	489	777
7	7	7	7	7	9

1. How many 7's are there in $7 + 7 + 7$? in 21?

2. How many 7's are there in 28? in 35? in 42?

3. State rapidly the results:

$70 \div 7$ $\qquad$ $63 \div 7$ $\qquad$ $14 \div 7$ $\qquad$ $49 \div 7$

4. Read and learn this table:

$14 \div 7 = 2$	$35 \div 7 = 5$	$56 \div 7 = 8$
$21 \div 7 = 3$	$42 \div 7 = 6$	$63 \div 7 = 9$
$28 \div 7 = 4$	$49 \div 7 = 7$	$70 \div 7 = 10$

5. State rapidly the results:

8×7	9×7	6×7	5×7
7×8	7×9	7×6	7×5
$56 \div 7$	$63 \div 7$	$42 \div 7$	$35 \div 7$
$56 \div 8$	$63 \div 9$	$42 \div 6$	$35 \div 5$

1. There are 56 children marching in rows of 7. How many rows are there?

2. An open trolley car with 7 cross seats will seat 35 persons. How many persons can sit on each seat?

3. Mary spent 42¢ for 6 yards of calico. How much did she pay a yard?

4. Kate spent 63¢ for 7 yards of ribbon. How much did she pay a yard?

5. A dealer paid $42 for 7 tables. How much did he pay for each table?

Division Continued. A farmer bought 7 cows for \$441. What was the average price per cow?

We see that each cow cost \$441 ÷ 7.

We see that 7 is not contained in 4, so we take 44 and divide it by 7.

$$7 \overline{)441} \atop 63$$

We know that $6 \times 7 = 42$, and so we see that $44 \div 7 = 6$, with a remainder of 2. Since we have divided 44 tens, we write the 6 in the tens' place.

The remainder, 2, is tens; so 2 tens $+ 1 = 21$, and $21 \div 7 = 3$. We write the 3 in the ones' place.

The quotient is 63, and so the average price was \$63.

Check. $7 \times 63 = 441$, the dividend.

The teacher may ask the pupils to label the numbers in division, that is, to place the dollar sign before 441 and 63; but the business man would not do this in such a case. The fact that $\$6 \div \$2 = 3$ and $\$6 \div 2 = \$3$ makes the use of labels in division very difficult for children as early as this.

It should be noticed that division by 8 and division by 9 are allowable on this page, provided the other factor in each separate division is 7 or less.

WRITTEN EXERCISE

1. At \$7 each, how many calves can a farmer buy with \$364? with \$371? with \$378? with \$714?

2. If there are 147 Boy Scouts marching in 7 equal squads, how many are there in each squad?

Divide the following, and check:

3. $651 \div 7$.	**7.** $726 \div 6$.	**11.** $725 \div 5$.
4. $654 \div 2$.	**8.** $567 \div 7$.	**12.** $511 \div 7$.
5. $648 \div 4$.	**9.** $679 \div 7$.	**13.** $456 \div 8$.
6. $635 \div 5$.	**10.** $434 \div 7$.	**14.** $909 \div 9$.

1. Add the columns of 8's from one 8 to five 8's.

2. Build more columns of 8's, until you have ten 8's in the last column. Then read the columns, thus: "One 8 is 8, two 8's are 16," and so on.

3. How many are five 8's? six 8's? seven 8's? eight 8's? nine 8's? ten 8's?

```
            8
         8  8
      8  8  8
   8  8  8  8
8  8  8  8  8
```

4. Read and learn this table of 8's:

$2 \times 8 = 16$	$5 \times 8 = 40$	$8 \times 8 = 64$
$3 \times 8 = 24$	$6 \times 8 = 48$	$9 \times 8 = 72$
$4 \times 8 = 32$	$7 \times 8 = 56$	$10 \times 8 = 80$

5. How much is 1×8? 8×1? 8×0? 0×8?

6. How much is $8 + 8 + 8 + 8 + 8$? What is the short way of finding the answer?

7. State rapidly the following products:

5×8	8×2	7×8	8×9
8×5	3×8	8×6	6×8
4×8	8×0	2×8	8×7
8×4	8×3	8×8	8×1

8. At 8¢ each, how much will 7 melons cost?

9. At $8 each, how much will 9 tables cost?

10. At 8¢ each, how much will 8 notebooks cost?

11. At 8 miles an hour, how far will a man drive a team of horses in 2 hours?

12. At 8¢ each, how much will 6 grapefruits cost?

ORAL EXERCISE

1. Recite the table of 8's from 1×8 to 10×8.

2. Recite the table of 8's from 8×1 to 8×10.

State the products :

3. 3×8.	**7.** 8×3.	**11.** 8×9.	**15.** 2×8.
4. 7×8.	**8.** 5×8.	**12.** 8×2.	**16.** 10×8.
5. 9×8.	**9.** 6×8.	**13.** 1×8.	**17.** 8×6.
6. 8×5.	**10.** 8×0.	**14.** 0×8.	**18.** 4×8.

State the answers :

19. $5 \times 8 + 4$.	**21.** $8 \times 7 + 6$.	**23.** $6 \times 8 + 2$.
20. $4 \times 8 + 3$.	**22.** $2 \times 8 + 1$.	**24.** $8 \times 2 + 1$.

WRITTEN EXERCISE

Multiply the following :

1.	**2.**	**3.**	**4.**	**5.**	**6.**
200	201	202	212	242	346
8	8	8	8	8	8

7.	**8.**	**9.**	**10.**	**11.**	**12.**
300	360	361	365	378	888
8	8	8	8	8	3

13.	**14.**	**15.**	**16.**	**17.**	**18.**
400	470	475	486	498	678
8	8	8	8	8	4

19.	**20.**	**21.**	**22.**	**23.**	**24.**
575	582	625	675	687	508
8	8	8	8	8	9

1. How many 8's are there in 16 ? in 24 ? in 40 ?

2. State rapidly the results :

$32 \div 8$ $\qquad$ $40 \div 8$ $\qquad$ $24 \div 8$ $\qquad$ $80 \div 8$

3. Read and learn this table :

$16 \div 8 = 2$	$40 \div 8 = 5$	$64 \div 8 = \ 8$
$24 \div 8 = 3$	$48 \div 8 = 6$	$72 \div 8 = \ 9$
$32 \div 8 = 4$	$56 \div 8 = 7$	$80 \div 8 = 10$

4. How many 8's are there in 32 ? in 48 ? in 72 ?

1. At \$8 each, how many rocking-chairs can be bought for \$72 ? for \$80 ? for \$56 ?

2. At 8¢ a quart, how many quarts of strawberries can be bought for 64¢ ? for 72¢ ?

3. A class has been weaving mats like this. How many horizontal strips are there ? How many vertical ones ? How many in all ?

4. In the picture you see 8 meshes on each line. How many meshes are there on 2 lines ? How many are there on 3 lines ? How many are there on 4 lines ?
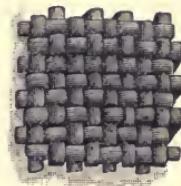
Divide the following :

5. $64 \div 8$.	**7.** $888 \div 8$.	**9.** $480 \div 8$.	**11.** $560 \div 8$.
6. $640 \div 8$.	**8.** $880 \div 8$.	**10.** $568 \div 8$.	**12.** $808 \div 8$.

1. State the sum of each of these columns of 9's thus: 9, 18, and so on.

2. Count by 9's from 9 to 90.

3. How many 9's do you see in the column that makes 36? in the one that makes 45?

```
                    9
                 9  9
              9  9  9
           9  9  9  9
        9  9  9  9  9
        ―  ―  ―  ―  ―
```

4. Read and learn this table of 9's:

$2 \times 9 = 18$	$5 \times 9 = 45$	$8 \times 9 = 72$
$3 \times 9 = 27$	$6 \times 9 = 54$	$9 \times 9 = 81$
$4 \times 9 = 36$	$7 \times 9 = 63$	$10 \times 9 = 90$

5. How much is 1×9? 9×1? 9×0? 0×9?

6. State rapidly the following products:

9×3	9×5	9×7	9×1
9×6	9×0	8×9	7×9
9×2	9×8	9×9	9×4

1. Write ten columns of 9's, as in Ex. 1 above, from one 9 to ten 9's. Add each column.

2. A man earns $10 a week. How much does he earn in 7 weeks? in 9 weeks? in 6 weeks?

3. John's father sold 9 tables at $8 apiece. How much did he receive for all the tables?

4. If you buy 9 oranges at 5¢ each, and 9 bananas at 3¢ each, how much do you pay for all?

1. At 9¢ each, what will 9 pencils cost?

2. At 9¢ a gallon, what will 7 gallons of oil cost?

3. At 9¢ a quart, what will 6 qt. of strawberries cost?

4. At 9 children to a group, how many children in 8 groups? in 6 groups? in 5 groups?

5. At 9¢ each, how much must a newsdealer pay for 8 magazines?

State the answers:

6. $2 \times 9 + 1$.	**9.** $8 \times 9 + 7$.	**12.** $5 \times 9 + 4$.
7. $4 \times 9 + 2$.	**10.** $9 \times 7 + 6$.	**13.** $9 \times 6 + 7$.
8. $7 \times 9 + 4$.	**11.** $9 \times 3 + 8$.	**14.** $6 \times 9 + 3$.

WRITTEN EXERCISE

Multiply the following:

1.	**2.**	**3.**	**4.**	**5.**	**6.**
243	320	406	572	863	742
9	9	9	9	9	9

7.	**8.**	**9.**	**10.**	**11.**	**12.**
982	989	909	879	859	576
3	5	9	6	5	8

13.	**14.**	**15.**	**16.**	**17.**	**18.**
456	586	489	539	839	983
9	9	5	6	7	9

19. A man bought some sugar for 20¢, and 3 packages of oatmeal at 9¢ each. How much did he pay for all?

ORAL EXERCISE

1. Recite the table of 9's from 1×9 to 10×9.

2. Recite the table of 9's from 9×1 to 9×10.

State these products :

3. 6×9.	**8.** 4×9.	**13.** 7×9.	**18.** 1×9.
4. 5×9.	**9.** 2×9.	**14.** 0×9.	**19.** 9×9.
5. 8×9.	**10.** 3×9.	**15.** 9×10.	**20.** 9×3.
6. 9×6.	**11.** 9×4.	**16.** 9×1.	**21.** 9×2.
7. 9×5.	**12.** 9×7.	**17.** 9×8.	**22.** 10×9.

State the answers :

23. $6 \times 9 + 5$.	**25.** $9 \times 9 + 7$.	**27.** $7 \times 9 + 2$.
24. $7 \times 9 + 3$.	**26.** $5 \times 9 + 3$.	**28.** $6 \times 9 + 4$.

WRITTEN EXERCISE

Multiply the following :

1.	**2.**	**3.**	**4.**	**5.**	**6.**
765	802	732	678	496	687
9	9	9	9	9	9

7.	**8.**	**9.**	**10.**	**11.**	**12.**
268	265	295	275	587	809
9	9	9	9	9	8

13.	**14.**	**15.**	**16.**	**17.**	**18.**
399	373	387	309	398	878
9	9	9	6	7	8

EP

ORAL EXERCISE

1. How many 9's are there in 18? in 27? in 36?

2. At $9 each, how many coats can be bought for $45? for $54? for $63?

3. At $9 each, how many dresses can be bought for $27? for $18? for $36? for $72?

4. State rapidly the results:

$18 \div 9$ $\qquad$ $27 \div 9$ $\qquad$ $36 \div 9$ $\qquad$ $45 \div 9$

5. Read and learn this table:

$18 \div 9 = 2$	$45 \div 9 = 5$	$72 \div 9 = 8$
$27 \div 9 = 3$	$54 \div 9 = 6$	$81 \div 9 = 9$
$36 \div 9 = 4$	$63 \div 9 = 7$	$90 \div 9 = 10$

WRITTEN EXERCISE

1. How many baseball teams, each made up of 9 boys, can be formed from 27 boys?

2. How many baseball teams, each made up of 9 boys, can be formed from 36 boys?

3. In this school there are 54 boys, and the boys are divided into baseball nines. How many nines are there?

Divide the following:

4. $180 \div 9$.	**8.** $189 \div 9$.	**12.** $900 \div 9$.
5. $279 \div 9$.	**9.** $540 \div 9$.	**13.** $990 \div 9$.
6. $369 \div 9$.	**10.** $360 \div 9$.	**14.** $999 \div 9$.
7. $459 \div 9$.	**11.** $450 \div 9$.	**15.** $909 \div 9$.

ORAL EXERCISE

Multiply each of the numbers 3, 6, 2, 9, 7, 5, 8, 4, in turn:

1. By 4, and add 3 to the product.

2. By 5, and add 4 or 3 to the product.

3. By 6, and add 5, 4, or 3 to the product.

4. By 7, and add 6, 5, 4, or 3 to the product.

5. By 8, and add 7, 6, 5, 4, or 3 to the product.

6. By 9, and add 8, 7, 6, 5, 4, or 3 to the product.

The teacher should direct the number to be added each time. The numbers to be multiplied should be written on the blackboard and the products read in the order given.

7. If you are sent to the grocer's for 7 lb. of sugar at 6¢ a pound, and 2¢ worth of candy, how much money must you pay the grocer?

8. If you are sent to buy 9 lb. of sugar at 6¢ a pound, and 5¢ worth of cloves, how much must you pay?

9. Frank has to buy 8 lb. of sugar at 5¢ a pound, and 7¢ worth of cinnamon. How much must he pay?

10. John is keeping store, and he has 6 piles of apples, 9 apples in each pile, and 4 apples besides. How many apples are there in all?

11. Some boy scouts are divided into 6 squads of 8 boys each, and there are 4 boys over. How many boys are there in all?

12. In one class there are 4 rows of 8 pupils each, and 3 pupils over. How many pupils are there in all?

1. Count by 10's from one 10 to ten 10's.

2. How many are three 10's? seven 10's?

3. Recite, "One 10 is 10, two 10's are 20," and so on to "ten 10's are 100."

4. Read and learn the table of 10's:

$2 \times 10 = 20$	$5 \times 10 = 50$	$8 \times 10 = 80$
$3 \times 10 = 30$	$6 \times 10 = 60$	$9 \times 10 = 90$
$4 \times 10 = 40$	$7 \times 10 = 70$	$10 \times 10 = 100$

5. How much is 10×5? 10×7? 10×2? 10×9?

6. A girl bought 3 cans of soup at 10¢ each, and a pound of figs for 20¢. How much did she pay?

7. If Mary buys 4 melons at 10¢ each, and an orange for 5¢, how much must she pay?

1. Build ten columns of 10's, from one 10 to ten 10's. Add each column.

2. Write the multiplication table of 10's from 1×10, and 2×10 to 10×10.

3. Write the multiplication table of 10's another way, from 10×1, and 10×2 to 10×10.

4. Complete and learn this table:

$20 \div 10 =$	$50 \div 10 =$	$80 \div 10 =$
$30 \div 10 =$	$60 \div 10 =$	$90 \div 10 =$
$40 \div 10 =$	$70 \div 10 =$	$100 \div 10 =$

ORAL DRILL IN MULTIPLICATION

Multiply the following numbers by 2 and by 3:

1. 21   23   32   31   22   33   41   43   42

Multiply the following numbers by 4 and by 5:

2. 20   30   40   50   70   21   31   80   41

Multiply the following numbers by 6 and by 7:

3. 11   50   90   70   21   81   60   31   80

4. 20   61   51   30   91   40   41   10   71

Multiply the following numbers by 8 and by 9:

5. 20   91   30   51   70   31   80   200   111

6. 41   50   21   60   61   40   71   310   211

WRITTEN EXERCISE

Multiply the following :

1.	2.	3.	4.	5.	6.
746	829	607	892	487	983
3	5	9	6	8	7

7.	8.	9.	10.	11.	12.
209	516	837	676	893	477
4	7	5	9	3	6

13.	14.	15.	16.	17.	18.
688	992	347	456	833	646
8	4	9	8	9	8

ORAL DRILL IN DIVISION

Divide each number by 2, 3, 4, and 5, in turn, giving quotients and remainders, taking first the lines 1–3, and then the columns 4–13:

	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1.	21	39	26	50	46	56	28	44	40	30
2.	38	34	51	31	22	45	59	55	49	35
3.	25	48	32	47	41	57	42	60	23	43

Divide, as above, each number by 6, 7, 8, and 9, in turn, giving quotients and remainders:

	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.
14.	10	16	19	17	20	18	21	24	23	22
15.	13	51	44	50	31	41	57	48	52	40
16.	15	42	29	59	26	65	47	32	64	61

WRITTEN EXERCISE

Divide each number by 2, 3, 4, 5, 6, 7, 8, and 9, in turn, giving quotients and remainders:

1. 125	243	627	481	936	829
2. 352	301	278	270	633	639
3. 473	486	907	842	568	781
4. 597	700	741	488	777	666

Teachers should clearly understand that drill pages of this kind are to be used only until the pupil has attained sufficient proficiency in the processes. The drill should then be discontinued and new work should be taken up.

V. USING WHAT YOU HAVE LEARNED

HOW THE CITY BOY AND GIRL USE THEIR ARITHMETIC

1. Mollie pays 10¢ a day for trolley fares in going to school. How much does she pay each week, if she goes every school day? How much does she pay in 2 weeks?

2. Rob's father took Rob and six of his friends to see the moving pictures. How many tickets did he buy in all? How much did it cost at 10 ¢ each?

3. Tom's father sent Tom to the post office to buy 25 two-cent stamps. How much did Tom pay for the stamps?
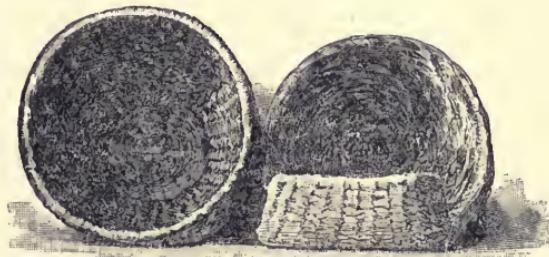
4. Some children in a city school made these baskets out of raffia. The raffia for the three baskets cost 12¢, and each took the same amount. What was the cost for each basket? What would be the cost for 15 baskets?

5. If each basket was sold for 10¢, what was the gain on each? What was the gain on the three? What would be the gain on 15 baskets?

6. Of these baskets the largest holds 8 pt. and the smallest holds 2 pt. The third holds half as much as the other two together. How much does the third hold?

EARNING AND SPENDING

1. George is a newsboy. He pays 3¢ for 5 papers. How much does he pay for 10 papers? for 15 papers?

2. Harold gets 25¢ for mowing a lawn. If he mows it 4 times a month, how much does he get in a month?

3. If it costs each pupil 60¢ a year for schoolbooks, how much will it cost 3 pupils each year?

4. Anna spends 5¢ every week going to the moving pictures. There being 52 weeks in a year, how much would she save in a year if she did not go?

5. John is in the third grade. His father buys him a reader for 40¢, an arithmetic for 30¢, a spelling book for 25¢, and a language book for 35¢. How much does he pay for all four books?

6. In Ex. 5, if John's father pays for the books with a $2 bill, how much change should he receive?

7. If you earn 50¢, 60¢, 20¢, and 70¢, how many cents do you earn in all? How many dollars is this?

8. Frank earns 70¢ and 50¢. How many cents does he earn? Write the answer also as dollars and cents.

9. Harold sold 140 copies of the *Saturday Evening Post* at 5¢ each. How many cents did he receive? How many dollars is this?

Instead of multiplying 5 by 140, multiply 140 by 5.

10. Fred's father sent him to the post office for 125 two-cent stamps. How much did Fred have to pay for the stamps?

VI. FRACTIONS

ORAL EXERCISE

1. Miriam is making some doll's clothes for her little sister's doll. She has a piece of ribbon 16 in. long and uses ½ of it. How many inches of ribbon does she use? ⌐

2. If Miriam had used ¼ of the 16 in. of ribbon, how many inches of ribbon would she have used?

3. If Miriam had used ¾ of the 16 in. of ribbon, how many inches of ribbon she have used?

4. How do you find ¼ of a number? How do you find ¾ of a number?

5. Miriam's mother has 24 yd. of calico, and she tells Miriam that she can have ⅛ of it. How many yards does she let Miriam have?

6. Can you tell me how many yards Miriam's mother had left after she gave Miriam ⅛ of the 24 yd.? How do you find this?

7. How do you find ⅛ of a number? After you have found ⅛ of a number, how can you find ⅜ of the number? ⅝ of the number? ⅞ of the number?

8. How do you find ⅙ of a number? After this has been found, how can you find ⅚ of the number? How can you then find 1⅚ times the number?

The pupil is now beginning the study of harder fractions, and he should be led to see the need for the work. It is not necessary that he should be able to answer all of these questions; indeed, it is better that he should not answer them too readily, if at all. The important thing is to let the pupil see the necessity of further work in fractions.

ORAL EXERCISE

1. Tell the number of halves in :

1    $1\frac{1}{2}$ 2 $2\frac{1}{2}$ 3 $3\frac{1}{2}$ 4   5   10

2. Tell the number of feet equal to :

$\frac{4}{2}$ ft. $\frac{6}{2}$ ft. $\frac{8}{2}$ ft. $\frac{3}{2}$ ft. $\frac{5}{2}$ ft. $\frac{7}{2}$ ft.

3. Tell the number of thirds in :

1   2   3 $1\frac{1}{3}$ $1\frac{2}{3}$ $2\frac{1}{3}$ $3\frac{1}{3}$ 4 $4\frac{2}{3}$

4. Tell the number of fourths in :

1   2   3 $1\frac{1}{4}$ $1\frac{3}{4}$ $2\frac{1}{4}$ $2\frac{3}{4}$ $3\frac{3}{4}$ $5\frac{1}{4}$
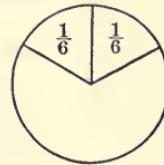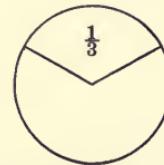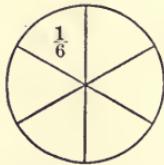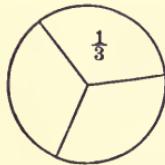
5. Which circles show you that $\frac{1}{3} = \frac{1}{6} + \frac{1}{6}$?

6. How many sixths do you see in $\frac{1}{2}$ of the circle ?

7. In the whole circle how many sixths do you see ?

WRITTEN EXERCISE

1. Divide a circle into halves, fourths, and eighths, and show that $\frac{1}{2} = \frac{2}{4} = \frac{4}{8}$.

2. Draw oblongs 4 inches long and 1 inch wide. Shade them to show that $1 - \frac{1}{4} = \frac{3}{4}$, $1 - \frac{3}{4} = \frac{1}{4}$, and $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$.

3. If a man has $1840 and spends $\frac{1}{4}$ of it, how much does he spend ? How much has he left ?

VII. MEASURES

ORAL EXERCISE

1. Name something that is sold by the bushel.

2. Name some kind of fruit that is sold by the peck.

3. How many pecks in a bushel?

4. How many quarts in a peck?

5. In the picture, point to the liquid pint, quart, and the measure called a gallon (gal.), which holds 4 qt.

6. Point to the dry quart, peck, and bushel.

Dry Measure. The table of dry measure is as follows:

2 pints (pt.) = 1 quart (qt.)
8 quarts = 1 peck (pk.)
4 pecks = 1 bushel (bu.)

WRITTEN EXERCISE

1. If a boy feeds his pony 2 qt. of oats three times a day, how many quarts will he feed him a day?

2. How many quarts in 2 pk.? in 4 pk.? in 1 bu.?

3. How many pecks in half a bushel? in 10 bu.?

ORAL EXERCISE

1. If you put a pound weight on one side of the scales, how many ounce weights must be put on the other side to balance it?

2. Then how many ounces make a pound? Then 1 ounce is what part of a pound?

Weight. The table of weight is as follows:

16 ounces (oz.) = 1 pound (lb.)

If there are scales in the school, children should weigh various objects, and also find that 16 ounces = 1 pound. Children sometimes make bags of different sizes, putting in enough sand to make them weigh 1 lb., ½ lb., and ¼ lb. The weights are then told, the children's eyes being closed.

---

3. The average height and weight of children of your age is about as follows:

	Boys	*Girls*	*Boys*	*Girls*
7 yr.	44 in.	44 in.	48 lb.	47 lb.
8 yr.	46 in.	46 in.	52 lb.	50 lb.
9 yr.	50 in.	49 in.	57 lb.	55 lb.

Compare your height and weight with the average.

WRITTEN EXERCISE

1. 579 lb. + 927 lb.

2. 648 lb. + 879 lb.

3. 737 lb. + 578 lb.

4. 998 lb. + 287 lb.

5. 981 lb. − 264 lb.

6. 923 lb. − 478 lb.

7. 961 lb. − 389 lb.

8. 800 lb. − 126 lb.

Area of a Square or Oblong. A square that is 1 in. on a side is 1 inch square. The *area* of such a square is 1 square inch.

A square that is 1 ft. on a side is 1 foot square, and the area of such a square is 1 square foot.

If an oblong is 4 ft. long and 2 ft. wide, its area is 8 square feet. There are 2 rows, with 4 square feet in a row; that is, there are 2 × 4 square feet. We say that such an oblong is 2 ft. by 4 ft.

The square inch and square foot should be drawn on the blackboard, and the idea of *area* should be made clear by numerous simple illustrations like the one given above. The pupils should ascertain the number of square inches in a square foot, and the number of square feet in a square yard.

Square Measure. In square measure we use the following table:

144 square inches (sq. in.) = 1 square foot (sq. ft.)

9 square feet = 1 square yard (sq. yd.)

WRITTEN EXERCISE

1. Draw a square yard, representing 1 yd. by 1 in. This is called drawing it to the *scale* of 1 in. to 1 yd.

2. Draw a square foot to the scale of 3 in. to 1 ft.

3. If an oblong is 3 in. long and 2 in. wide, how many square inches has it? Draw the figure.

4. If a schoolroom is 10 yd. long and 7 yd. wide, how many square yards are there in the floor?
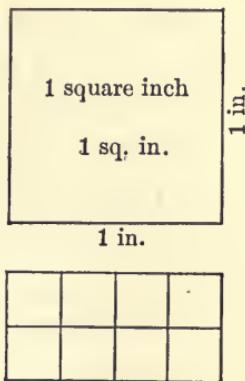
ORAL EXERCISE

1. The top of a box is an oblong 3 in. wide and 6 in. long. What is the area?

2. A sheet of paper is 4 in. by 7 in. What is the area?

3. A pane of glass is 9 in. by 10 in. What is the area?

4. An oblong is 7 in. long and 3 in. wide. What is the area? What is the sum of all the sides?

5. A square is 4 yd. on a side. Find the area, and the sum of all the sides.

The teacher may introduce the word "perimeter," in place of "sum of all the sides," if desired. Practice should be given in estimating areas.

WRITTEN EXERCISE

1. Draw an oblong 6 in. long and 4 in. wide. Find the area and the sum of all the sides.

2. Draw an oblong one half as long and one half as wide as the first oblong (Ex. 1). Find the area.

3. Find the area and the sum of all the sides of an oblong 8 ft. long and 5 ft. wide.

4. A square 6 yd. on a side contains how many square yards? How many yards in the sum of all the sides?

5. Measure the length and the width of your arithmetic. Each page contains how many square inches?

6. Draw a 2-inch square. Draw a 4-inch square. The 2-inch square equals what part of the 4-inch square? Find the area and the sum of all the sides of the 2-inch square, and also of the 4-inch square.

VIII. REVIEW

ORAL EXERCISE

1. How many school days in 1 week? in 2 weeks?

2. How many school days in 3 weeks? in 5 weeks?

3. How many school days in 7 weeks? in 8 weeks?

4. How many hours are you in school in the forenoon? in the afternoon? all day?

5. How many hours are you in school in 5 days?

6. $3 + 5.$	**11.** $5 + 3.$	**16.** $4 + 6.$	**21.** $6 + 4.$
7. $8 - 3.$	**12.** $8 - 5.$	**17.** $10 - 4.$	**22.** $10 - 6.$
8. $3 \times 5.$	**13.** $5 \times 3.$	**18.** $4 \times 6.$	**23.** $6 \times 4.$
9. $15 \div 3.$	**14.** $15 \div 5.$	**19.** $24 \div 4.$	**24.** $24 \div 6.$
10. $\frac{1}{3}$ of 15.	**15.** $\frac{1}{5}$ of 15.	**20.** $\frac{1}{4}$ of 24.	**25.** $\frac{1}{6}$ of 24.

WRITTEN EXERCISE

Add the following:

1.	**2.**	**3.**	**4.**	**5.**
$2.78	$4.87	$17.29	$26.48	$34.75
3.42	6.93	14.32	42.76	41.25
4.20	8.40	.18	39.37	6.00

6.	**7.**	**8.**	**9.**	**10.**
$1.27	$2.97	$19.37	$78.25	$57.32
2.43	3.23	23.48	49.75	49.68
4.09	5.71	4.29	33.33	81.93
.76	8.49	16.71	49.67	42.07
5.34	6.90	18.35	8.00	61.00

1. If Mary finds that eggs cost 40¢ a dozen, how much must she pay for 2 dozen eggs?

2. If butter costs 40¢ a pound, how much must Mary pay for 2 lb. of butter?

3. If oranges cost 5¢ apiece, how much must Mary pay for 4 oranges?

4. If cheese costs 20¢ a pound, how much must Mary pay for 3 lb. of cheese?

5. Mary bought 2 cans of baking powder at 40¢ a can. How much did she pay?

6. $4 + 7$.	**11.** $7 + 4$.	**16.** $5 + 8$.	**21.** $8 + 5$.
7. $11 - 4$.	**12.** $11 - 7$.	**17.** $13 - 5$.	**22.** $13 - 8$.
8. 4×7.	**13.** 7×4.	**18.** 5×8.	**23.** 8×5.
9. $28 \div 4$.	**14.** $28 \div 7$.	**19.** $40 \div 5$.	**24.** $40 \div 8$.
10. $\frac{1}{4}$ of 28.	**15.** $\frac{1}{7}$ of 28.	**20.** $\frac{1}{5}$ of 40.	**25.** $\frac{1}{8}$ of 40.

1. How much must Mary pay for 3 lb. of figs at 18¢ a pound? at 19¢ a pound?

2. How much must Mary pay for 2 qt. of sirup at 46¢ a quart? at 48¢ a quart?

3. How much must Mary pay for 3 tins of wafers at 27¢ a tin? at 24¢ a tin?

4. How much must Mary pay for 3 lb. of raisins at 25¢ a pound? at 23¢ a pound?

WRITTEN EXERCISE

Add and check :

1.	2.	3.	4.	5.
$8.26	$4.79	$6.87	$81.96	$78.92
9.42	3.42	4.91	32.88	81.36
3.82	5.39	5.73	56.42	47.57
1.23	2.27	1.06	41.60	37.43

6.	7.	8.	9.	10.
$9.83	$7.35	$7.34	$27.42	$21.97
4.78	8.42	8.29	19.37	32.43
6.42	9.98	6.42	18.62	68.74
8.96	.67	4.31	5.34	42.96

Subtract and check :

11.	12.	13.	14.	15.
$9.39	$8.72	$7.31	$15.78	$27.42
6.43	4.96	2.48	13.92	16.96

16.	17.	18.	19.	20.
$8.21	$9.00	$8.10	$47.01	$68.75
4.32	4.76	3.92	22.43	49.96

21.	22.	23.	24.	25.
$5.77	$9.11	$8.17	$37.82	$91.10
2.68	2.32	4.96	14.93	28.75

26.	27.	28.	29.	30.
$9.07	$8.02	$6.00	$30.00	$90.04
6.49	3.70	4.27	6.94	27.70

EP

WRITTEN EXERCISE

Multiply the following :

1.	2.	3.	4.	5.
$271	$486	$595	$643	$781
2	3	4	5	6

6.	7.	8.	9.	10.
$842	$937	$249	$342	$873
7	8	9	7	8

11.	12.	13.	14.	15.
$998	$843	$777	$398	$873
6	7	7	8	9

16. Divide each of these numbers by 2 and by 3 :

276	378	612	342	486	570
348	492	204	726	498	288
222	528	180	414	336	960

17. Divide each of these numbers by 4 and by 5 :

280	560	820	980	480	500
460	340	740	220	900	620

18. Divide each of these numbers by 6 and by 7 :

420	840	462	210	294	378
546	882	504	252	336	924

19. Divide each of these numbers by 8 and by 9 :

720	360	288	504	648	936
792	216	432	576	864	144

Find the cost of the following :

1. 2 doz. eggs at 40¢ a dozen; at 50¢ a dozen.
2. 8 lb. of crackers at 8¢ a pound; at 9¢ a pound.
3. 2 lb. of tea at 40¢ a pound; at 30¢ a pound.
4. 5 lb. of prunes at 7¢ a pound; at 8¢ a pound.
5. 6 lb. of starch at 9¢ a pound; at 10¢ a pound.
6. 8 lb. of rice at 8¢ a pound; at 9¢ a pound.
7. $\frac{1}{2}$ lb. of figs at 20¢ a pound; at 22¢ a pound.
8. 7 lb. of crackers at 10¢ a pound; at 9¢ a pound.

WRITTEN EXERCISE

Find the cost of the following :

1. 2 lb. of coffee at 35¢ a pound; at 37¢ a pound.
2. 4 lb. of raisins at 12¢ a pound; at 14¢ a pound.
3. 2 lb. of tea at 48¢ a pound; at 46¢ a pound.
4. 2 doz. eggs at 47¢ a dozen; at 44¢ a dozen.
5. $\frac{1}{2}$ doz. oranges at 60¢ a dozen; at 80¢ a dozen.
6. $\frac{1}{2}$ doz. bananas at 36¢ a dozen; at 40¢ a dozen.
7. 2 doz. bananas at 36¢ a dozen; at 38¢ a dozen.

Find the total cost in each example :

8. 2 lb. of sugar at 6¢ a pound; 3 lb. of prunes at 8¢ a pound; 5 lb. of rice at 8¢ a pound.

9. 3 lb. of starch at 9¢ a pound; 2 lb. of crackers at 12¢ a pound; $\frac{1}{2}$ doz. oranges at 40¢ a dozen.

WRITTEN EXERCISE

1. Write in figures: five thousand fifty-five; eighteen hundred fifty-eight; seven thousand three hundred forty-six; nineteen hundred fourteen.

2. The rents for an office building for one month were as follows: first floor, $384; second floor, $290; third floor, $275; fourth floor, $186. What was the total rent?

3. Four coal trains left the mines loaded as follows: the first had 1100 tons of coal; the second, 1275 tons; the third, 998 tons; the fourth, 1822 tons. How many tons of coal did the four trains carry?

It is legitimate to use the word "ton" as an indefinite term at the present time. Children hear such words used, and the teacher may explain them informally. Similarly for such words as "mile" and "year."

4. A merchant's receipts for one day were $298.85, $624.88, and $157.60. What were the total receipts?

5. A town has to-day 8967 inhabitants. It gained 1289 in ten years. How many were there ten years ago?

6. A train started with 500 passengers and made four stops on a trip. At the first stop 89 passengers got off; at the second, 78; at the third, 122; at the fourth, 55. How many passengers remained on the train?

7. By one way it is 411 miles from New York to Buffalo and 541 miles from Buffalo to Chicago. How far is it from New York to Chicago?

8. A dealer offered $7.85 apiece for some suits of clothes, but $9.15 apiece was asked for them. How much more was asked than was offered for the suits?

9. A farmer paid 6¢ a pound for some hogs. He kept them a week at no expense, during which time they gained 58 lb., and he then sold them for 6¢ a pound. How many cents did he gain by keeping them? How many dollars?

10. If it costs $129 to run a locomotive one trip between two cities, how much will it cost for nine trips?

11. A teacher receives $45 per month for 9 months. How much does she receive in all?

12. A mile contains 5280 ft. How many feet are there in half a mile?

13. If milk costs 7¢ a quart and a family uses 2 qt. a day, how much will be the milk bill for 7 da.?

14. A man paid $487 for some land. He built on it a house costing $2225 and a barn costing $250. What was the total cost of the land and buildings?

15. Ralph receives $55 a month for 7 months, and George $45 a month for 9 months. What is the total amount received by each?

16. What is the cost of 216 calves at $9 each?

17. A farmer paid $329 for 7 cows. How much did he pay for each cow?

18. What is the cost of 564 tons of coal at $6 per ton?

19. What is the cost of 9 tables at $17 each?

20. Frank pays a debt of $26.17, and gives in payment 3 ten-dollar bills. How much change should he receive?

21. A bushel of oats weighs 32 lb. How many pounds do 8 bu. of oats weigh?

WRITTEN EXERCISE

Add the following, and check:

1.	2.	3.	4.	5.
$5.43	$9.34	$8.27	$11.17	$13.37
1.27	2.18	9.36	25.25	72.26
3.19	6.25	10.19	37.37	87.19

6.	7.	8.	9.	10.
$2.03	$8.12	$12.12	$14.05	$30.03
3.04	7.32	13.13	11.10	20.02
3.21	5.13	21.21	31.32	40.01
5.51	6.41	32.32	23.50	50.50
6.18	7.56	18.72	15.68	19.87

11.	12.	13.	14.	15.
$4.06	$5.17	$13.78	$16.27	$15.76
2.98	6.24	14.26	18.42	8.24
3.74	8.19	19.16	27.96	24.16
2.45	3.32	12.04	11.34	14.26
6.17	4.46	18.75	12.19	18.91
9.63	8.75	22.67	19.84	22.68

16.	17.	18.	19.	20.
$6.17	$2.99	$9.99	$10.06	$1.98
2.98	1.86	1.06	9.80	10.47
1.48	3.47	22.14	4.29	8.93
3.65	8.21	13.87	13.62	26.12
2.91	1.69	20.16	8.75	10.89
1.64	5.16	7.98	22.10	37.16
7.49	8.22	10.00	41.09	9.48

Subtract the following, and check:

21.	22.	23.	24.	25.
$7.45	$7.89	$8.59	$9.33	$36.55
5.03	4.63	5.26	7.29	28.00

26.	27.	28.	29.	30.
$9.51	$5.65	$6.41	$6.73	$17.44
3.28	1.27	2.38	1.09	8.36

31.	32.	33.	34.	35.
$8.63	$7.11	$9.16	$8.92	$24.31
2.99	4.09	2.38	3.19	15.42

36.	37.	38.	39.	40.
$9.17	$8.45	$6.07	$9.36	$46.18
6.29	4.56	3.08	4.07	20.09

Multiply the following:

41.	42.	43.	44.	45.
$113	$224	$510	$1612	$1175
3	4	5	6	8

46.	47.	48.	49.	50.
$950	$699	$907	$1128	$1750
7	5	9	8	4

51.	52.	53.	54.	55.
$675	$709	$812	$1050	$1425
8	7	9	9	6

56. Divide each of these numbers by 2:

468	456	372	331	634	972
326	253	214	547	418	905

57. Divide each of these numbers by 3:

354	365	624	484	408	798
444	235	651	790	891	976

58. Divide each of these numbers by 4:

924	824	955	564	592	918
752	912	734	723	961	513

59. Divide each of these numbers by 5:

510	520	644	770	590	742
665	735	560	887	623	825

60. Divide each of these numbers by 6:

666	636	732	727	822	924
624	725	746	810	845	933

61. Divide each of these numbers by 7:

728	785	812	861	910	943
745	797	805	873	935	950

62. Divide each of these numbers by 8:

728	656	592	392	928	111
744	672	512	304	984	222

63. Divide each of these numbers by 9:

333	738	549	567	702	777
666	657	324	405	801	888

DRILL TEST. MULTIPLICATION

Write all the answers in two minutes or less:

1. 4×6.	11. 6×4.	21. 7×5.	31. 9×6.
2. 7×3.	12. 4×7.	22. 9×9.	32. 3×9.
3. 8×2.	13. 8×6.	23. 4×8.	33. 8×7.
4. 5×6.	14. 7×4.	24. 6×5.	34. 4×9.
5. 7×7.	15. 5×7.	25. 7×9.	35. 9×8.
6. 6×3.	16. 8×3.	26. 9×4.	36. 6×6.
7. 8×5.	17. 6×8.	27. 5×8.	37. 8×8.
8. 9×2.	18. 3×8.	28. 9×7.	38. 5×9.
9. 6×7.	19. 7×8.	29. 8×4.	39. 7×6.
10. 9×5.	20. 9×3.	30. 6×9.	40. 8×9.

DRILL TEST. DIVISION

Write all the answers in two minutes or less:

1. $12 \div 4$.	11. $18 \div 6$.	21. $64 \div 8$.	31. $35 \div 5$.
2. $12 \div 6$.	12. $21 \div 7$.	22. $45 \div 5$.	32. $24 \div 4$.
3. $32 \div 8$.	13. $24 \div 8$.	23. $24 \div 6$.	33. $72 \div 9$.
4. $54 \div 9$.	14. $16 \div 4$.	24. $28 \div 7$.	34. $27 \div 3$.
5. $36 \div 4$.	15. $48 \div 8$.	25. $63 \div 9$.	35. $42 \div 6$.
6. $63 \div 7$.	16. $54 \div 6$.	26. $27 \div 9$.	36. $24 \div 2$.
7. $48 \div 6$.	17. $72 \div 8$.	27. $20 \div 4$.	37. $56 \div 7$.
8. $45 \div 9$.	18. $35 \div 7$.	28. $56 \div 8$.	38. $18 \div 9$.
9. $28 \div 4$.	19. $36 \div 9$.	29. $36 \div 6$.	39. $55 \div 5$.
10. $49 \div 7$.	20. $32 \div 4$.	30. $42 \div 7$.	40. $81 \div 9$.

IX. USING WHAT YOU HAVE LEARNED

A BIRTHDAY PARTY

1. Louise is having a birthday party. She bought 8 small candles at 2¢ each and one larger candle for 3¢. How much did she pay for all of the candles?

2. If Louise gave the storekeeper 25¢ for the candles, how much change did she get back?

3. Seven of her friends came. If she provided four pieces of cake for each one who came and four for herself, how many pieces did she provide?

4. She made a cake, using 3 eggs worth 36¢ a dozen, 3¢ worth of sugar, 2¢ worth of flour, and 2¢ worth of other materials. How much did all the materials cost?

BUYING THINGS WE WOULD LIKE

1. Frank can get an express wagon for 65¢. He has saved 48¢. How much more must he save to buy the wagon?

2. Fred wants a bicycle. He sees one that is marked $13.50. The dealer tells him he can have it for $1.25 less. How much will the bicycle cost him?

3. Kate wants a tricycle. Her father finds that one will cost $2.75. If he gives her $5 for her birthday, she can buy the tricycle and then have how much money left?

4. Louise wants a pair of shears. She can buy them for 45¢. If she gives the dealer a dollar bill, how much change should she receive?

5. If you buy a box of water-color paints for 25¢, some brushes for 18¢, some colored crayons for 10¢, and some paper for 15¢, how much will it all cost?

6. Louise wants to weave some rugs for her doll house. She finds that a wooden loom will cost 35¢, some weaving needles 15¢, and some rug yarn 35¢. How much will it all cost? How much change should Louise receive if she gives the dealer a dollar?

7. Kate wants a fountain pen. She can buy one for 90¢, but by paying 40¢ more she can buy the kind she wants. How much must she pay for the pen she wants? How much change should she receive if she gives the dealer $1.50?

8. Kate's father promised her a hammock and a swing for her birthday. The hammock cost $2.65 and the swing cost $0.85. How much did the two cost?

X. LITTLE EXAMINATIONS

I. 1. $39 + 7.$ 5. $26 + 37.$ 9. $XX = (?).$
    2. $27 + 6.$ 6. $63 - 41.$ 10. $\$1.25 + \$2.30.$
    3. $28 + 9.$ 7. $9 \times 6.$ 11. $4 \times 6 + 2.$
    4. $37 + 4.$ 8. $2 \times 808.$ 12. $369 \div 9.$

II. 1. $46 + 9.$ 5. $72 - 36.$ 9. $XVII = (?).$
    2. $25 + 8.$ 6. $56 + 38.$ 10. $\$2.36 + \$1.22.$
    3. $79 + 2.$ 7. $8 \times 9.$ 11. $7 \times 8 + 6.$
    4. $48 + 7.$ 8. $6 \times 275.$ 12. $588 \div 7.$

III. 1. $37 + 7.$ 5. $52 - 29.$ 9. $XVI = (?).$
     2. $38 + 8.$ 6. $94 + 23.$ 10. $\$2.31 + \$1.92.$
     3. $35 + 7.$ 7. $4 \times 381.$ 11. $8 \times 9 + 7.$
     4. $76 + 8.$ 8. $6 \times 384.$ 12. $576 \div 6.$

IV. 1. $49 + 6.$ 5. $63 - 48.$ 9. $XIX = (?).$
    2. $56 + 7.$ 6. $7 \times 8.$ 10. $\$3.42 + \$1.73.$
    3. $47 + 8.$ 7. $7 \times 223.$ 11. $9 \times 6 + 4.$
    4. $58 + 6.$ 8. $7 \times 225.$ 12. $9 \text{ ft.} = (?) \text{ in.}$

V. 1. $58 + 3.$ 5. $38 + 16.$ 9. $XIV = (?).$
    2. $26 + 6.$ 6. $72 - 66.$ 10. $8 \text{ pt.} = (?) \text{ qt.}$
    3. $39 + 3.$ 7. $8 \times 6.$ 11. $8 \times 8 + 2.$
    4. $67 + 9.$ 8. $9 \times 288.$ 12. $512 \div 8.$

These Little Examinations may be used on different days near the close of a term. Teachers should read the note on page 52.

CHAPTER IV

I. READING AND WRITING NUMBERS

ORAL EXERCISE

1. Count by 10's from 10 to 100.

2. Count by 100's from 100 to 1000.

3. Count by 1000's from 1000 to 10,000.

4. Count by 10,000's from 10,000 to 90,000.

———

The number 100,000 is read " one hundred thousand."

In a number of five figures a comma (,) is written between the thousands and the hundreds. In 23,546

> the 6 occupies the ones' place,
> the 4 occupies the tens' place,
> the 5 occupies the hundreds' place,
> the 3 occupies the thousands' place,
> the 2 occupies the ten-thousands' place.

———

Read the following :

5. 40,000.	**9.** 41,000.	**13.** 41,500.	**17.** 41,525.
6. 50,000.	**10.** 50,500.	**14.** 50,050.	**18.** 50,005.
7. 60,000.	**11.** 63,000.	**15.** 63,075.	**19.** 63,975.
8. 76,450.	**12.** 82,729.	**16.** 86,483.	**20.** 99,999.

Roman Notation. The Roman notation, used chiefly for numbering the chapters of books, employs seven capital letters, as follows:

Letters,	I	V	X	L	C	D	M
Values,	1	5	10	50	100	500	1000

The first nine numbers are written thus:

I   II   III   IV or IIII   V   VI   VII   VIII   IX

The tens are written thus:

X   XX   XXX   XL   L   LX   LXX   LXXX   XC

The hundreds are written thus:

C   CC   CCC   CD   D   DC   DCC   DCCC   DCCCC or CM

The numbers from eleven to nineteen are written thus:

XI   XII   XIII   XIV   XV   XVI   XVII   XVIII   XIX

The following are examples of other numbers:

XXIII = 23   XCVIII = 98   CLXVI = 166

XXXVI = 36   LXXVI = 76   CCCLIX = 359

MDCCCCXVII or MCMXVII = 1917

WRITTEN EXERCISE

Write in common figures:

1. XI.   3. XXVI.   5. LXXII.   7. LXXVII.

2. LXIV.   4. LXVI.   6. XCVII.   8. XXXIV.

Write in Roman numerals:

9. 31.   11. 42.   13. 67.   15. 175.   17. 1919.

10. 89.   12. 91.   14. 75.   16. 150.   18. 1920.

II. ADDITION

WRITTEN EXERCISE

Copy, add, and check in five minutes or less:

1.		2.		3.		4.		5.	
3	45	5	28	7	33	9	48	12	35
	72		82	1	56		89	6	10
1	86	4	64		21	7	17	14	65
2	17		26	4	74		51		79
	94	3	25		36	10	52	8	20

Copy, add, and check in six minutes or less:

6.		7.		8.		9.		10.	
10	87	3	15	20	45	16	17	13	96
1	45	12	08	12	16	28	45	8	44
2	32	13	47	13	18	13	92	19	27
19	80	10	26	24	72	11	15	21	13
	17	41	80	15	65	8	78	12	68

11. A farmer sold milk on four days as follows: Monday, 224 qt.; Tuesday, 246 qt.; Wednesday, 238 qt.; Thursday, 228 qt. How many quarts did he sell in all?

12. When Ethel's father went to Chicago he paid $12.80 for his ticket, $7.75 at the hotel, $24.75 in shopping, and $875 for an automobile. How much did he spend in all?

13. On the first day of the fair 7214 tickets were sold; on the second day 8112 tickets, and on the third day 6125 tickets. How many tickets were sold on the three days?

III. SUBTRACTION

WRITTEN EXERCISE

1. How much more is 224 ft. than 187 ft. ?

2. How many less are 224 men than 301 men ?

3. How much more is the sum of 426 and 182 than the sum of 97 and 58 ?

4. How much less is the sum of 196 and 259 than the sum of 437 and 296 ?

5. A farmer who had 235 chickens sold 86 of them. How many had he left ? He then bought 52 more. How many chickens did he then have ?

6. A farmer had 68 sheep. After buying 75 more, how many did he have ? If he then sold 40 sheep, how many did he then have ?

7. A man's income for a year is $1500 and $280, and his expenses are $1275. How much does he save ?

8. A man's salary is $1400 a year, and he receives $180 from a house which he rents. His expenses for the year are $1142. How much does he save ?

9. How many more Boy Scouts are there in a regiment made up of 76 boys under twelve years of age and 89 boys over twelve years of age than there are in a regiment of 144 boys ?

10. A boy had a kite string 428 ft. long. He tied on 356 ft. more, and later lost 68 ft. in a tree. How many feet of string did he have left ?

ORAL EXERCISE

If you owe the following sums, how much change should you receive from $1 in each case?

1. 90¢   95¢   80¢   85¢   70¢   75¢   88¢   92¢   81¢

2. 30¢   60¢   45¢   38¢   49¢   62¢   36¢   43¢   77¢

3. 10¢   20¢   25¢   35¢   41¢   33¢   66¢   79¢   89¢

If you owe the following sums, how much change should you receive from $2 in each case?

4. $1.25 $1.50 $1.75 $1.80 $1.90 $1.95

5. $1.35 $1.38 $1.62 $1.56 $1.88 $1.17

6. $1.82 $1.61 $0.75 $1.20 $1.32 $1.44

If you owe the following sums, how much change should you receive from $5 in each case?

7. $2.25 $3.25 $4.75 $2.80 $3.50 $1.50

8. $3.80 $4.10 $2.60 $1.40 $2.10 $4.15

9. $2.78 $3.75 $4.60 $3.90 $2.01 $3.07

WRITTEN EXERCISE

Subtract, and check the work:

	1.	2.	3.	4.	5.
	$281.42	$691.75	$298.30	$427.20	$532.60
	135.02	208.02	107.60	109.32	237.62

	6.	7.	8.	9.	10.
	$532.65	$281.92	$409.72	$672.35	$491.63
	206.39	192.60	286.58	148.39	269.75

EP

IV. MULTIPLICATION

Terms Used. We have already learned that when we take a number 2 times we multiply it by 2, that when we take it 3 times we multiply it by 3, and so on.

Pupils are not expected to learn formal definitions at this stage.

We have also learned (page 85) the names of the terms used in multiplication. These are *multiplicand*, *multiplier*, and *product*, and are seen in the next example.

Multiplying Money. If a bookseller sells 7 books at $1.25 each, how much money does he receive for them?

We see that we must multiply $1.25 by 7.

We first see that $7 \times 5 \ccent = 35 \cent$, or 3 dimes and 5 cents, and we write the 5 in the cents' place and add the 3 to the dimes.

$$
\begin{array}{r}
\$1.25 \text{ multiplicand} \\
7 \text{ multiplier} \\
\hline
\$8.75 \text{ product}
\end{array}
$$

Then 7×2 dimes $= 14$ dimes, and 14 dimes $+ 3$ dimes $= 17$ dimes, or $1.70. We write the 7 in the dimes' place and add the 1 to the dollars.

We then write the decimal point, to separate the dollars from the dimes.

Then $7 \times \$1 = \$7$, and $\$7 + \$1 = \$8$, and we write the 8 in the dollars' place.

The product is $8.75, and so the bookseller receives $8.75 for the 7 books.

Therefore, *to multiply United States money, multiply as with other numbers, placing the decimal point in the product below the decimal point in the multiplicand.*

WRITTEN EXERCISE

Multiply the following :

1.	2.	3.	4.	5.
135	$1.35	275	$12.75	$10.20
2	2	2	2	4

6.	7.	8.	9.	10.
$3.75	$1.35	$7.25	$18.60	$20.30
2	3	3	4	5

11.	12.	13.	14.	15.
$9.30	$8.95	$2.33	$23.42	$24.70
4	4	5	5	6

16.	17.	18.	19.	20.
$4.81	$4.09	$7.28	$43.00	$36.75
6	6	6	7	5

21.	22.	23.	24.	25.
$3.09	$3.59	$4.86	$71.93	$49.78
7	7	8	8	6

26.	27.	28.	29.	30.
$6.32	$2.13	$12.75	$14.75	$82.86
9	9	9	9	8

31. At $2.25 a yard, how much will 2 yd. of silk cost?

32. At $3.25 each, how much will 7 desks cost?

33. At $6.50 each, how much will 6 tables cost?

34. At $7.35 each, how much will 8 boys' suits cost?

1. How much is 10×2? 10×20?

2. To multiply by 10, how many zeros do you annex?

3. How much is 10×25? 10×47?

Multiply by 10:

4. 7	70	73	26	27	33	82	52
5. 34	48	29	66	87	41	79	99

6. How much is $10 \times \$3$? $10 \times \$3.00$?

7. How much is $10 \times \$7$? $10 \times \$7.50$?

8. How much is $10 \times \$15$? $10 \times \$15.75$?

9. How much is $10 \times \$21.50$? $10 \times \$100$?

Multiplying by Tens. *To multiply by 10, annex a zero. If there is a decimal point, move it one place to the right.*

Thus $10 \times 75 = 750$, and $10 \times \$7.50 = \$75.00$.

The result of both $10 \times \$3$ and $10 \times \$3.00$ is \$30. We may write this as \$30, or as \$30.00. The product of $10 \times \$1.25$ is \$12.50, not \$12.5, it being the custom to put a zero at the right in such a case.

To multiply by 100, annex two zeros. Move any decimal point two places to the right.

To multiply by 20, multiply by 2 and annex a zero.

To multiply by 200, multiply by 2 and annex two zeros.

25	32
20	300
500	9600

We write the numbers and express the work as shown above in the multiplication of 25 by 20 and of 32 by 300.

WRITTEN EXERCISE

Multiply by 10 :

1. $2.75	$12.75	$22.75	$25.50
2. $26.00	$48.30	$53.25	$69.73
3. $82.96	$100.00	$200.00	$500.

Multiply by 20 :

4. 42	36	81	53	67
5. 39	$1.20	$2.20	$3.50	$2.23
6. $4.50	$5.70	$4.90	$7.75	$9.65

Multiply by 100 :

7. 4	22	45	50	81	75	42	86
8. 77	36	83	87	63	66	29	99

Multiply by 200 :

9. 5	8	7	9	6	15	18	25
10. 35	41	48	55	46	60	67	75

11. At $2 each, how much will 30 chairs cost?

12. At $3 each, how much will 40 tables cost?

13. At $5 each, how much will 50 desks cost?

14. At $6 each, how much will 70 coats cost?

15. At $32 each, how much will 20 bedroom sets cost?

16. At $60 each, how much will 30 cows cost?

17. At $3.50 each, how much will 20 hats cost?

18. At $17.50 each, how much will 20 office desks cost?

19. At $22.75 each, how much will 30 overcoats cost?

WRITTEN EXERCISE

1. How much will 10 doz. pencils cost at 30¢ a dozen? at 36¢ a dozen? at 42¢ a dozen?

2. How much will 10 boxes of crayons cost at 35¢ a box? at 38¢ a box? at 43¢ a box?

3. At 10¢ apiece, how much will 2 doz. blackboard pointers cost? How much will 3 doz. cost?

4. At 10¢ a small package, how much will half a dozen small packages of pens cost?

5. How many fingers have the pupils in a class of 27? How many toes? How many fingers and toes?

6. If an arithmetic costs 35¢, how much must be paid for 10 arithmetics? for 2 arithmetics?

7. If a book costs $1.25, how much must be paid for 10 such books? for 20 such books? for 30 such books?

8. At $12.75 each, how much must a dealer pay for 40 suits of boys' clothes? for 60 suits?

9. At $38.25 each, how much must a dealer pay for 30 bedroom sets? for 40 sets? for 60 sets?

10. At $62.50 an acre, how much must a farmer pay for 80 acres of land? for 90 acres? for 70 acres?

11. At $45.50 each, how much must a furniture dealer pay for 50 dining-room sets? for 20 sets? for 40 sets?

12. At $37.75 each, how much must a dealer pay for 80 office desks? for 70 desks? for 30 desks?

13. At $87.50 each, how much must a dealer pay for 20 Texas ponies? for 30 Texas ponies?

Two-Figure Multiplier. To multiply 35 by 21, we write
the numbers as here shown.

We first multiply by 1, the product being 35.
We write the 5 below the ones.

We then multiply by 2 tens, the product
being 70 tens. We write this so that the
right-hand figure (0) is below the multiplier (2),
in the tens' place.

Adding, the total product is 735.

$$\begin{array}{r} 35 \\ 21 \\ \hline 35 \\ 70 \\ \hline 735 \end{array}$$

WRITTEN EXERCISE

1. At \$32 each, how much will a merchant pay for
21 suits of clothes? for 31 suits?

2. At \$43 each, how much will a dealer pay for 21 bed-
room sets? for 31 sets? for 41 sets?

3. Multiply by 21:

| 46 | 53 | 65 | 76 | 83 | 38 | 52 | 94 | 60 |

4. Multiply by 31 and by 41, in turn:

| 27 | 52 | 74 | 39 | 85 | 41 | 28 | 63 | 96 |

Multiply by 52, 62, and 72, in turn:

5. 33 | 46 | 57 | 44 | 35 | 68 | 55 | 79 | 82

6. 47 | 69 | 25 | 71 | 93 | 36 | 84 | 58 | 95

Multiply the following:

7. 63×95 63×84 83×88 93×97

8. 74×96 84×98 94×99 64×88

Two-Figure Multiplier. To multiply $2.75 by 54, we write the numbers as here shown.

We multiply in the usual way, first by 4 units and then by 5 tens.

In the product we place the decimal point between dollars and dimes.

The product is $148.50.

$$
\begin{array}{r}
\$2.75 \\
54 \\
\hline
1100 \\
1375 \\
\hline
\$148.50
\end{array}
$$

<small>Teachers who feel that the class needs a more complete explanation may refer back to page 172.</small>

WRITTEN EXERCISE

Multiply the following:

1. $4.82 by 15.	6. $1.23 by 12.	11. $3.27 by 62.
2. $4.09 by 19.	7. $2.17 by 32.	12. $3.96 by 28.
3. $2.81 by 38.	8. $3.41 by 29.	13. $1.39 by 39.
4. $2.99 by 27.	9. $4.80 by 36.	14. $1.75 by 68.
5. $0.69 by 73.	10. $5.60 by 71.	15. $0.75 by 89.

16. At $24 a dozen, how much will 24 silver tablespoons cost? How much will 24 doz. cost?

17. At $36 a dozen, how much must a dealer pay for 4 cut-glass vases? for 26 doz.? for 15 doz.?

18. At $7 each, how much will 12 armchairs cost? What will be the cost of 25? of 38? of 46?

Multiply the following:

19. $23 \times \$2.56$.	22. $41 \times \$3.45$.	25. $52 \times \$2.86$.
20. $28 \times \$3.91$.	23. $43 \times \$3.05$.	26. $75 \times \$3.08$.
21. $75 \times \$4.00$.	24. $75 \times \$4.50$.	27. $36 \times \$5.50$.

WRITTEN EXERCISE

In solving these examples in multiplication see how large a score you can make in five minutes, counting every correct result 1, and subtracting 2 for every incorrect result:

1.	2.	3.	4.	5.	6.
\$2.50	\$3.65	\$4.80	\$5.25	\$12.50	\$27.62
31	22	34	42	44	20

7.	8.	9.	10.	11.	12.
\$4.60	\$7.95	\$5.92	\$9.37	\$13.75	\$52.96
22	26	36	39	64	30

13.	14.	15.	16.	17.	18.
\$5.80	\$8.34	\$8.75	\$9.99	\$48.70	\$99.99
75	27	48	99	82	90

19. A clothing dealer bought 75 suits of clothes at \$12.25 each. How much did he pay for the lot?

20. A dealer bought 48 automobiles at \$427.50 each. How much did he pay for the lot?

Multiply the following:

21.	22.	23.	24.	25.
\$425.25	\$275.05	\$162.73	\$421.11	\$228.96
32	34	36	71	30

26.	27.	28.	29.	30.
\$326.45	\$241.36	\$432.47	\$225.25	\$600.09
28	35	26	88	80

Three-Figure Multiplier. 1. A city dealer buys 234 automobiles at $348 per car. How much do the cars cost him?

We see that we must multiply $348 by 234.

We multiply by 4, and write the product, 1392, so that the right-hand figure (2) is in the ones' place. We then multiply by 3, and write the product, 1044, so that the right-hand figure (4) is in the tens' place.

We then multiply by 2, and write the product, 696, so that the right-hand figure (6) is in the hundreds' place.

```
  $348
   234
  1392
  1044
   696
$81432
```

The product is $81,432, and this is the cost of the cars.

2. If the dealer buys 240 cars at $720 each, how much do all the cars cost him?

To multiply by 240 is the same as to multiply by 10 × 24. We multiply by 10 by annexing 0, and so we may multiply $720 by 24 and annex 0 as here shown.

```
   $720
    240
  28800
  1440
$172800
```

The product is $172,800, the total cost.

WRITTEN EXERCISE

Multiply the following :

1.	2.	3.	4.	5.	6.
231	231	439	575	$575	$356
111	123	123	222	322	550

7.	8.	9.	10.	11.	12.
243	348	329	426	$527	$481
126	241	423	178	136	670

Multiplication Continued. A maker sells 204 wagons at $116.67 per wagon. How much money does he receive?

We see that he receives 204 × $116.67.

We multiply as on page 180, except that there is no need to multiply by 0.

We multiply by 4, and write the product, 46668, so that the right-hand figure (8) is in the ones' place. We multiply by 2, and, because we are multiplying by hundreds, we write the product

```
     $116.67
         204
      466 68
    23334
    $23800.68
```

so that the right-hand figure (4) is in the hundreds' place.

The product is $23,800.68, and this is the money received.

The pupils are already familiar with multiplication involving money, and they know where to place the decimal point.

WRITTEN EXERCISE

1. At $85 an acre, how much must a farmer pay for 104 acres of land? for 107 acres? for 109 acres?

2. At $37.50 a head, how much will 102 head of cattle cost? 143 head? 107 head? 109 head?

Multiply the following:

3.	4.	5.	6.	7.
$481.20	$502.75	$681.39	$217.42	$321.50
104	109	102	206	371

8.	9.	10.	11.	12.
$491.76	$482.75	$536.47	$671.70	$879.90
381	243	308	426	897

REVIEW DRILL

Find the cost of the following:

1. 6 books at 31¢.
2. 3 lb. of tea at 42¢.
3. 4 cows at $41.
4. 6 lb. of steak at 21¢.
5. 7 collars at 21¢.
6. 6 flags at 15¢.
7. 6 lb. of figs at 15¢.
8. 12 pencils at 3¢.
9. 9 lb. of meat at 20¢.
10. 15 trout flies at 8¢.
11. 9 lb. of sugar at 6¢.
12. 9 cans of soup at 12¢.
13. 8 yd. of carpet at 70¢.
14. 5 cans of cocoa at 41¢.
15. 9 gallons of oil at 21¢.
16. 7 tennis balls at 20¢.
17. 3 writing tablets at 15¢.
18. 7 lb. of butter at 30¢.
19. 2 bu. of wheat at 90¢.
20. 8 lb. of walnuts at 15¢.
21. 21 yd. of ribbon at 9¢.
22. 3 lb. of cheese at 32¢.
23. 18 doz. buttons at 5¢.
24. 4 sewing machines at $42.

Find the cost of the following, and the change due:

25. 6 lb. of roast beef at 20¢. Paid $1.25.
26. 7 writing tablets at 12¢. Paid $1.
27. 2 pencils at 5¢ and 3 tablets at 12¢. Paid 50¢.
28. 3 cows at $40 and 2 sheep at $6. Paid $140.
29. 2 horses at $125 and a carriage at $100. Paid $400.
30. 5 acres of land at $90 and 2 acres at $50. Paid $600.
31. 7 cows at $50 and 6 cows at $40. Paid $600.
32. 5 tables at $15 and 20 desks at $4. Paid $160.
33. 8 chairs at $2 and a table at $9. Paid $30.

Exs. 1-24 may be taken for oral work.

V. USING WHAT YOU HAVE LEARNED

BUYING PRESENTS FOR CHRISTMAS

1. If some children pay 45¢ for a Christmas tree and give the dealer 50¢, how much change is due?

2. If Maude buys 9 candy canes, at 8¢ each, how much do they cost? How much change should she get from 75¢?

3. If Mollie buys her mother 4 handkerchiefs at 25¢ each, how much do they cost?

4. If Jack buys 10 colored balls at 4¢ each, how much do they cost?

5. Sue buys 5 strings of tinsel at 12¢ a string. How much does the tinsel cost?

6. How much will 2 doz. candles cost at 18¢ a dozen?

7. The children bought some toys costing 10¢, 20¢, 32¢, 30¢, 10¢, 25¢. How much did these all cost?

GOING TO THE PQST OFFICE   `

1. It costs 2¢ for a stamp for a letter weighing 1 oz. or less. How much will stamps for a dozen letters cost?

In the examples, each letter may be taken as weighing 1 oz.

2. A postal card costs 1¢. How much will it cost you to buy a half dozen postal cards and 8 stamps for letters?

3. If you have a friend living in Italy, a postage stamp for a letter to be sent there will cost 5¢. How much will it cost for postage if you write a letter every month for the twelve months of a year?

4. If you send a newspaper by mail, the postage is 1¢ for each 4 oz. or less. How much will it cost to send a letter, 3 postal cards, and a newspaper weighing 4 oz.?

5. You can send parcels through the post office. If your cousin lives about 100 miles away, and you wish to send him a book weighing 2 lb., the postage will be 6¢. How much will it cost to send him such a book, a letter, and a newspaper as heavy as the one in Ex. 4?

6. If you are in a hurry to have your letter delivered, you may put on a special-delivery stamp, costing 10¢, besides the postage on the letter. How much will it cost you to send a special-delivery letter?

7. If you are sent to the post office to buy 2 doz. 2-cent stamps, 5 postal cards, and a special-delivery stamp, how much money must you take with you?

The pupils should be asked to state problems from their own experience similar to the above.

A DAY IN THE CITY

1. Irene's father took her to the city. Their railroad tickets cost $2.10. They paid 50¢ for street-car fares and $1.50 for luncheon. They paid 75¢ for a cab to make a call. How much money did they spend?

2. Irene's father gave her the money for some Christmas presents. She bought a doll for $1.25, a pair of skates for $1.50, a bat and a glove to give to her brother Fred for $1.25, and some handkerchiefs for her mother for 75¢. How much did she spend in all?

3. At a fruit stand Irene saw the sign, "Apples, 3 for 5¢." How many apples could she buy for 10¢?

4. Irene's father owed three bills in the city. The amounts were $125, $16.50, and $48.25. She went with him when he paid them. How much did he pay in all?

5. Irene's father sent a telegram of 16 words. It cost him 40¢ for the first ten words, and 3¢ for each additional word. How much did he pay for sending the telegram?

6. Irene did some shopping for her mother. She bought two pairs of gloves at $1.50 a pair, and three handkerchiefs at 25¢ each. How much did she pay for them all?

7. Irene's father bought for her brother Fred a story book costing 75¢, a tennis racket costing $1.50, and a ball costing 45¢. How much did all three cost?

8. A football team in their town had asked Irene's father to find what their suits would cost. He found that the price was $3.50 each. How much will 11 suits cost? How much will 22 suits cost?

REVIEW DRILL

Multiply the following:

1. 37×96.	24. $4 \times \$12.75$.	47. $32 \times \$11.48$.
2. 48×74.	25. $6 \times \$31.76$.	48. $46 \times \$12.87$.
3. 56×89.	26. $8 \times \$96.43$.	49. $84 \times \$21.96$.
4. 76×846.	27. $7 \times \$86.52$.	50. $34 \times \$28.47$.
5. 87×987.	28. $5 \times \$77.77$.	51. $37 \times \$39.05$.
6. 49×757.	29. $9 \times \$65.78$.	52. $40 \times \$37.62$.
7. 86×848.	30. $50 \times \$6.70$.	53. $26 \times \$48.37$.
8. 79×837.	31. $82 \times \$4.48$.	54. $32 \times \$61.76$.
9. 47×563.	32. $72 \times \$6.93$.	55. $56 \times \$82.78$.
10. 80×909.	33. $84 \times \$4.72$.	56. $29 \times \$70.06$.
11. 86×876.	34. $73 \times \$6.48$.	57. $36 \times \$72.83$.
12. 43×907.	35. $66 \times \$4.96$.	58. $48 \times \$86.96$.
13. 139×462.	36. $54 \times \$3.97$.	59. $57 \times \$91.87$.
14. 823×823.	37. $27 \times \$8.71$.	60. $67 \times \$75.78$.
15. 237×409.	38. $42 \times \$6.77$.	61. $49 \times \$81.96$.
16. 207×439.	39. $73 \times \$9.75$.	62. $73 \times \$29.78$.
17. 342×826.	40. $54 \times \$8.44$.	63. $82 \times \$41.86$.
18. 436×896.	41. $38 \times \$7.62$.	64. $67 \times \$92.98$.
19. 525×687.	42. $87 \times \$7.56$.	65. $76 \times \$87.46$.
20. 426×839.	43. $43 \times \$8.91$.	66. $64 \times \$37.92$.
21. 572×678.	44. $57 \times \$5.40$.	67. $59 \times \$89.98$.
22. 420×745.	45. $75 \times \$8.60$.	68. $65 \times \$56.68$.
23. 530×820.	46. $86 \times \$9.55$.	69. $91 \times \$37.48$.

VI. DIVISION

ORAL EXERCISE

1. How many 10's are there in 20? in 30? in 150?

2. Do you see an easy way of dividing by 10?

3. Divide each of these numbers by 10:

  160   210   230   340   480   560   750

4. How many 2's in 4? How many 20's in 40?

5. Do you see an easy way of dividing by 20?

Dividing by 10's. In dividing 240 by 20 we may cancel the 0's in 20 and 240, and simply divide 24 by 2 as here shown.

    The quotient is 12.

$$2\cancel{0}\,)\,24\cancel{0}$$
$$\overline{\phantom{2\cancel{0}\,)\,}12}$$

WRITTEN EXERCISE

1. Divide by 20:

  120   140   180   260   380   540   780

Divide by 30:

2. 120   240   360   390   420   450   480

3. 510   570   630   690   720   810   960

Divide the following:

4. $480 \div 40$.	8. $720 \div 60$.	12. $2870 \div 70$.
5. $560 \div 40$.	9. $960 \div 60$.	13. $1400 \div 70$.
6. $750 \div 50$.	10. $1440 \div 60$.	14. $1400 \div 700$.
7. $360 \div 60$.	11. $2340 \div 90$.	15. $9600 \div 800$.

EP

Fraction in the Quotient. If we divide 4162 by 3, we find that the quotient is 1387 with a remainder of 1. If we divide this remainder, 1, by 3, we have $\frac{1}{3}$. We write this $\frac{1}{3}$ in the quotient.

$$3)\overline{4162}$$
$$1387\tfrac{1}{3}$$

The number by which we divide is called the *divisor*.

The number divided is called the *dividend*.

The result of division is called the *quotient*.

The dividend is the product of the divisor and the quotient.

If we divide 4163 by 10, we see that the remainder is 3, the last figure in the number divided. We write the work as here shown.

$$10)\overline{416\cancel{3}}$$
$$416\tfrac{3}{10}$$

WRITTEN EXERCISE

Find the quotients, and write the remainders as fractions:

1. $2743 \div 3$.	12. $4127 \div 2$.	23. $6464 \div 9$.
2. $4173 \div 4$.	13. $8345 \div 6$.	24. $5072 \div 3$.
3. $6131 \div 5$.	14. $9281 \div 5$.	25. $4352 \div 7$.
4. $4237 \div 6$.	15. $8196 \div 7$.	26. $8773 \div 8$.
5. $8195 \div 7$.	16. $4237 \div 8$.	27. $5225 \div 4$.
6. $2575 \div 8$.	17. $3496 \div 9$.	28. $8231 \div 10$.
7. $3241 \div 9$.	18. $7843 \div 6$.	29. $6243 \div 10$.
8. $6871 \div 5$.	19. $8207 \div 5$.	30. $9187 \div 10$.
9. $8233 \div 4$.	20. $3267 \div 8$.	31. $2983 \div 10$.
10. $4673 \div 8$.	21. $9725 \div 6$.	32. $3761 \div 10$.
11. $6793 \div 4$.	22. $4195 \div 9$.	33. $3767 \div 10$.

ORAL EXERCISE

1. How much is 8×10? $80 \div 8$? $80 \div 10$?

2. How much is 8×11? $88 \div 8$? $88 \div 11$?

3. How much is 10×11? $110 \div 10$? $110 \div 11$?

State the following products and quotients:

4. 7×11	$77 \div 7$	$77 \div 11$	$99 \div 11$
5. 6×11	$66 \div 6$	$66 \div 11$	$55 \div 11$
6. 4×11	$44 \div 4$	$44 \div 11$	$33 \div 11$

7. If we divide 22 by 11, what is the quotient?

8. If we divide 23 by 11, what is the quotient and what is the remainder?

Divide each of the following numbers by 11, stating the quotient and also the remainder, if any:

9. 33	34	35	37	39	40
10. 44	46	47	49	50	54
11. 66	69	70	71	73	76
12. 88	89	91	93	95	97
13. 22	220	330	331	442	556
14. 55	550	660	661	777	441

15. If the school has to pay $11 for a teacher's desk, how many desks can it buy for $25, and how much money will it have left?

16. If the school has to pay $4 for a pupil's desk, how many desks can it buy for $25, and how much money will it have left?

17. If a dealer in school desks has to pay $3 for a pupil's desk, how do you find how many desks he can buy for $200, and how much money he will have left?

The pupil is not expected to perform the operation mentally. The purpose of this oral question and of those immediately following is to lead him to see the importance of extending his knowledge to long division.

18. If the dealer mentioned in Ex. 17 has to pay $11 for a teacher's desk, and has $200 with which to buy a number of such desks, how do you find how many desks he can buy for $200, and how much money he will have left? Can you do this work yet? Could you do it if the price of each desk was $10 instead of $11?

Divide such of the following numbers by 11 as you can easily divide without pencil and paper, and write the others down on paper and divide them after you have studied the next page:

19. 11	110	1100	2200	3300
20. 44	440	4400	5555	6600
21. 77	770	7700	8877	9900
22. 24	221	7705	5507	6609
23. 98	451	7810	6831	7296
24. 66	660	6666	6644	4466
25. 22	220	2244	4422	2288
26. 33	330	3430	3443	3454
27. 55	551	5500	5610	5621
28. 88	883	8800	8811	8921
29. 99	997	9999	9911	8932

Long Division. If a dealer pays $154 for 11 boys' suits, how much does he pay for each suit?

For each suit he must pay $154 ÷ 11, so we need to know how to divide $154 by 11. In such a division we need not write the dollar sign ($).

The following shows the work which we do:

		WRITTEN WORK	CHECK
Divide,	15 ÷ 11	$\begin{array}{r} 14 \\ 11\overline{)154} \\ 11 \\ \hline 44 \\ 44 \\ \hline \end{array}$	14
Multiply,	1 × 11		11
Subtract; then 44 ÷ 11			$\overline{14}$
Multiply,	4 × 11		14
Subtract; no remainder			$\overline{154}$

The teacher should take up this work on the blackboard, explain what is done in each step, show the pupil what he is expected to write (Written Work), and explain the check.

WRITTEN EXERCISE

Divide each of these numbers by 11:

1. 121.	**4.** 1221.	**7.** 1331.	**10.** 4741.	**13.** 2541.
2. 132.	**5.** 1232.	**8.** 1441.	**11.** 3531.	**14.** 7887.
3. 143.	**6.** 1551.	**9.** 3861.	**12.** 2332.	**15.** 1705.

16. At $11 each, how many football suits can a dealer buy for $715? for $726? for $836?

17. At $11 each, how many Boy Scout suits can a dealer buy for $242? for $352? for $363?

18. If 11 girls weigh 638 lb., what is their average weight?

The idea of "average" should be explained to the class if necessary.

Two-Figure Divisor. A piano manufacturer sold 21 pianos for $7161. How much did he receive for each piano?

We see that we must divide $7161 by 21.

Before we divide, it is a good plan, at first, to write out a table of 21's, as follows:

$1 \times 21 = 21$	$4 \times 21 = 84$	$7 \times 21 = 147$
$2 \times 21 = 42$	$5 \times 21 = 105$	$8 \times 21 = 168$
$3 \times 21 = 63$	$6 \times 21 = 126$	$9 \times 21 = 189$

Such tables should not be used after the form of the work is understood.

We see that we have first to divide 71 hundreds by 21. From the table we see that $3 \times 21 = 63$, or 8 less than 71. So we know that 71 hundreds $\div 21 = 3$ hundreds, with a remainder of 8 hundreds.

We therefore write the 3 in the hundreds' place as the first figure of the quotient.

The remainder, 8 hundreds, equals 80 tens, and 80 tens + 6 tens = 86 tens.

From the table we see that $4 \times 21 = 84$, which is 2 less than 86. So we know that 86 tens $\div 21 = 4$ tens, with a remainder of

$$
\begin{array}{r}
341 \\
21{\overline{\smash{\big)}\,7161}} \\
\underline{63} \\
86 \\
\underline{84} \\
21 \\
\underline{21}
\end{array}
$$

2 tens, or 20. We therefore write the 4 in the quotient, in the tens' place.

Then $20 + 1 = 21$, still to be divided. $21 \div 21 = 1$, and we write the 1 in the quotient, in the ones' place.

The quotient is then 341, and so the manufacturer received $341 for each piano.

To check the answer, $21 \times \$341 = \$7161$.

*Divide the following numbers by 21 and state the quotient ;
if you cannot tell the quotient readily, divide the first figure
of the dividend by the first figure of the divisor :*

   1. 42   63   84   168   126   147

*Divide the following numbers by 41 and state the quotient ;
dividing the first two figures of the dividend by the first figure
of the divisor :*

   2. 205   123   164   246   287   369

State only the first figure in the quotient :

3. $462 \div 21$.	**6.** $620 \div 31$.	**9.** $1230 \div 41$.
4. $693 \div 21$.	**7.** $651 \div 31$.	**10.** $1271 \div 41$.
5. $399 \div 21$.	**8.** $682 \div 31$.	**11.** $1530 \div 51$.

Divide the following :

1. $483 \div 21$.	**6.** $496 \div 31$.	**11.** $3024 \div 21$.
2. $945 \div 21$.	**7.** $943 \div 41$.	**12.** $1386 \div 21$.
3. $525 \div 21$.	**8.** $589 \div 31$.	**13.** $2079 \div 21$.
4. $2436 \div 21$.	**9.** $1147 \div 31$.	**14.** $2601 \div 51$.
5. $2793 \div 21$.	**10.** $5661 \div 51$.	**15.** $1491 \div 71$.

16. At \$21 a dozen, how many rifles can a dealer buy
for \$504? for \$693?

17. At \$31 a dozen, how many dozen boys' sweaters can
a dealer buy for \$651? for \$961?

Long Division Continued. To divide 3328 by 32 we write the numbers as here shown.

We see that 33 hundreds ÷ 32 = 1 hundred, with a remainder of 1 hundred.

We write the 1 in the quotient in the hundreds' place.

Bringing down the next figure, 2 (tens), we have 12 tens to be divided by 32.

But 12 does not contain 32, so we write 0 in the quotient in the tens' place.

$$
\begin{array}{r}
104 \\
32\overline{)3328} \\
32 \\
\hline
128 \\
128 \\
\hline
\end{array}
$$

Bringing down the next figure, 8, we have 128 to be divided by 32.

$128 \div 32 = 4$, and we write the 4 in the ones' place.

The quotient is 104.

WRITTEN EXERCISE

Divide the following :

1. $1302 \div 21.$	**5.** $6363 \div 21.$	**9.** $4824 \div 12.$
2. $1224 \div 12.$	**6.** $6384 \div 12.$	**10.** $2442 \div 22.$
3. $3840 \div 32.$	**7.** $2142 \div 42.$	**11.** $5304 \div 52.$
4. $3844 \div 62.$	**8.** $3968 \div 62.$	**12.** $7344 \div 72.$

13. A manufacturer receives $6882 for a number of canoes, each canoe selling at $31. How many canoes does he sell?

14. A dealer pays $2398 for a number of bicycles, each bicycle costing $22. How many bicycles does he buy?

15. A dealer buys a lot of young Shetland ponies for $72 apiece. He pays $7704. How many ponies does he buy?

Long Division Continued. To divide 4510 by 79 we write
the numbers as here shown.

At first we might think that, because
$45 \div 7 = 6$ and a remainder, the first fig-
ure in the quotient should be 6. But this
would be too large, as we should find,
because $6 \times 79 = 474$, which is larger
than 451.

We see that 79 is nearly 80, and so we
see that we can find the first figure more

$$
\begin{array}{r}
57 \\
79 \overline{)4510} \\
395 \\
\hline
560 \\
553 \\
\hline
7
\end{array}
$$

easily by thinking of $45 \div 8$ than by thinking of $45 \div 7$.

*In division, no product should be larger than the number
above it; no remainder after any subtraction should be larger
than the divisor.*

Now, dividing in the usual way, we find that the quotient
is 57 and that there is a remainder of 7. It is customary
to write the result $57\frac{7}{79}$.

<center>**WRITTEN EXERCISE**</center>

Divide the following :

1. $5929 \div 49.$	**6.** $8172 \div 59.$	**11.** $4675 \div 99.$
2. $3219 \div 29.$	**7.** $2448 \div 78.$	**12.** $5183 \div 58.$
3. $1135 \div 29.$	**8.** $8636 \div 98.$	**13.** $5334 \div 77.$
4. $2269 \div 39.$	**9.** $1585 \div 99.$	**14.** $6977 \div 88.$
5. $4091 \div 69.$	**10.** $5155 \div 37.$	**15.** $6363 \div 96.$

16. A dealer pays \$6375 for some sailboats at \$75 each.
How many boats does he buy?

WRITTEN EXERCISE

Divide, and check the work by multiplying:

1. $189 \div 21$.	**6.** $328 \div 41$.	**11.** $648 \div 81$.
2. $637 \div 91$.	**7.** $639 \div 71$.	**12.** $488 \div 61$.
3. $224 \div 32$.	**8.** $416 \div 52$.	**13.** $504 \div 72$.
4. $498 \div 83$.	**9.** $438 \div 73$.	**14.** $837 \div 93$.
5. $236 \div 59$.	**10.** $553 \div 79$.	**15.** $792 \div 99$.

Divide, writing " remainder" after each remainder:

16. $2706 \div 41$.	**24.** $3366 \div 51$.	**32.** $6461 \div 71$.
17. $5368 \div 61$.	**25.** $6238 \div 81$.	**33.** $6647 \div 91$.
18. $6724 \div 82$.	**26.** $9568 \div 92$.	**34.** $5084 \div 62$.
19. $7447 \div 73$.	**27.** $3498 \div 53$.	**35.** $9504 \div 72$.
20. $7614 \div 94$.	**28.** $6809 \div 84$.	**36.** $3569 \div 29$.
21. $6434 \div 59$.	**29.** $7345 \div 65$.	**37.** $8148 \div 74$.
22. $2464 \div 22$.	**30.** $5346 \div 22$.	**38.** $3366 \div 66$.
23. $5475 \div 77$.	**31.** $9639 \div 44$.	**39.** $3905 \div 55$.

Divide, using fractions instead of remainders:

40. $4872 \div 56$.	**47.** $3441 \div 37$.	**54.** $3655 \div 43$.
41. $2697 \div 93$.	**48.** $8579 \div 73$.	**55.** $2576 \div 92$.
42. $3648 \div 32$.	**49.** $8957 \div 79$.	**56.** $9853 \div 49$.
43. $8512 \div 76$.	**50.** $7319 \div 53$.	**57.** $7369 \div 52$.
44. $8556 \div 23$.	**51.** $8609 \div 61$.	**58.** $9423 \div 63$.
45. $5110 \div 14$.	**52.** $6891 \div 31$.	**59.** $6578 \div 74$.
46. $5248 \div 64$.	**53.** $3954 \div 23$.	**60.** $6457 \div 59$.

1. If a farmer pays $1935 for 43 head of cattle, how much does he pay a head?

2. An agent sells 23 sewing machines for $483. How much does he receive for each?

3. The school attendance for 23 days in our room was 805. What was the daily attendance?

4. A city dealer bought 25 children's bicycles for $275. How much did they cost apiece?

5. At $71 each, how many Texas ponies can be bought for $1491? How many can be bought for $1562?

6. An express train ran 559 miles in 13 hr. What was the rate per hour?

7. How many street cars, each carrying 72 persons, will it take to carry 3312 persons?

8. A buyer paid $2112 for 64 cows. How much was that for each cow?

9. How many hours will it take an automobile to go 1254 miles, if it goes at the rate of 19 miles an hour?

10. A man has $1275 with which to purchase cows. At $55 apiece, how many cows can he buy, and how much money will he have left?

Divide the following:

11. $38,178 \div 63$.	**14.** $78,408 \div 99$.	**17.** $69,375 \div 75$.
12. $30,456 \div 94$.	**15.** $84,864 \div 52$.	**18.** $89,568 \div 96$.
13. $26,896 \div 82$.	**16.** $54,432 \div 84$.	**19.** $37,950 \div 75$.

Dividing Dollars and Cents. 1. A man paid $5 for four sleds for his boys. How much did he pay for each sled?

Each sled cost $\frac{1}{4}$ of $5, or $5 ÷ 4, so we must know how to divide $5 by 4.

We write $5.00 for $5 and divide just as we do with other numbers, placing the decimal point in the quotient exactly below the decimal point in the dividend.

$$\begin{array}{r} 4)\overline{\$5.00} \\ \hline \$1.25 \end{array}$$

The quotient is $1.25, so he paid $1.25 for each sled.

2. A dealer paid $28.35 for 21 sleds. How much did he pay for each sled?

Each sled cost $28.35 ÷ 21.

We divide just as we do with other numbers, placing the decimal point in the quotient exactly above the decimal point in the dividend. The quotient is $1.35, so he paid $1.35 for each sled.

We check our work by multiplying $1.35 by 21, the result being $28.35.

$$\begin{array}{r} \$1.35 \\ 21)\overline{\$28.35} \\ 21 \\ \hline 73 \\ 63 \\ \hline 105 \\ 105 \\ \hline \end{array}$$

Divide the following:

1. $7 ÷ 5.	5. $5.40 ÷ 12.	9. $32.40 ÷ 12.
2. $2.70 ÷ 5.	6. $5.40 ÷ 15.	10. $75.60 ÷ 14.
3. $15.12 ÷ 7.	7. $5.04 ÷ 14.	11. $15.12 ÷ 56.
4. $25.92 ÷ 9.	8. $8.64 ÷ 27.	12. $25.92 ÷ 54.

Some schools do not at this time take up the work on this page. The page is not needed for the regular work (except page 199).

WRITTEN EXERCISE

1. A farmer in Iowa raised 9000 bu. of corn on 72 acres. How many bushels did each acre average?

The word "average" should again be explained to the children, if necessary, together with the expression "on an average" and the method of finding the average cost of several articles.

2. A laborer earned $70 in 28 days. How much did he earn per day?

3. A family spends $468 for groceries in a year. How much is that a week?

In all such cases the children should be told to take 52 weeks to a year, and should understand that the average expenditure per week is required.

4. An electric-light bill was $15.04 for 94 days. How much did it average per day?

5. Mary's uncle has a fine herd of 48 cows valued at $3600. What are the cows worth on the average?

6. If an automobile dealer sells 56 cars for $47,600, what is the average price per car?

7. If a family pays $364.80 for food in 96 days, what is the average cost per day?

Divide, giving the quotient, and the remainder if any:

8. $896 \div 28$.	**14.** $2450 \div 50$.	**20.** $\$77 \div 55$.
9. $396 \div 66$.	**15.** $2450 \div 49$.	**21.** $\$46.80 \div 78$.
10. $448 \div 14$.	**16.** $5292 \div 98$.	**22.** $32,225 \div 72$.
11. $272 \div 68$.	**17.** $3087 \div 98$.	**23.** $41,005 \div 67$.
12. $528 \div 22$.	**18.** $6897 \div 57$.	**24.** $77,760 \div 96$.
13. $630 \div 21$.	**19.** $7872 \div 82$.	**25.** $80,976 \div 84$.

VII. FRACTIONS

ORAL EXERCISE

1. Maud needs $\frac{1}{2}$ of a yard of cloth for a doll's dress. She has a yard of cloth. How many dresses can she make from it?

2. She has 2 yd. of another kind of cloth. How many dresses, of the kind stated in Ex. 1, can she make from it?

3. If Maud uses $\frac{1}{3}$ of a piece of cloth that is $1\frac{1}{2}$ yd. long, what part of a yard does she use? Draw a line on the blackboard to represent $1\frac{1}{2}$ yd., and mark off $\frac{1}{3}$ of it.

Teachers should recognize that the object of such a problem, as of this entire page, is to show the necessity for further work in fractions. It is not so important that the question should be answered promptly, as to have the pupil feel that he must learn more about fractions. The problems furnish a motive for progress.

4. Maud's mother gives her a piece of cloth 16 in. long and tells her she can have half of it. Maud says that even 16 in. is not enough, but that she needs $1\frac{1}{2}$ times as much. How do you find how much Maud needs? Can you tell how much she needs?

5. Maud's mother tells her that she has a piece of cloth 30 in. long and can spare her all but 6 in. How much can Maud have? Is this as much as she needs according to Maud's suggestion in Ex. 4?

6. For trimming some dolls' clothes Maud has a piece of ribbon $5\frac{1}{2}$ in. long, and another piece of the same kind $5\frac{1}{4}$ in. long. Allowing a loss of $\frac{1}{4}$ in. for sewing the pieces together, how long a piece will these make?

1. How many halves in 1 apple? in $1\frac{1}{2}$ apples?

2. How many halves in 2 apples? in $2\frac{1}{2}$ apples? in $3\frac{1}{2}$ apples? in 4 apples?

3. How many whole apples in $\frac{2}{2}$ apples? in $\frac{6}{2}$ apples? in $\frac{4}{2}$ apples? in $\frac{10}{2}$ apples?

4. How many inches are $1\frac{1}{2}$ in. $+\frac{1}{2}$ in.? $1\frac{1}{2}$ in. $+1\frac{1}{2}$ in.? $3\frac{1}{2}$ in. $+1\frac{1}{2}$ in.? $3\frac{1}{2}$ in. $+2$ in.? $3\frac{1}{2}$ in. $+2\frac{1}{2}$ in.?

5. If Harriet needs $2\frac{1}{2}$ yd. of cloth for some sewing, and has $3\frac{1}{2}$ yd., how much has she to spare?

State the results:

6. $3\frac{1}{2} + \frac{1}{2}$. **8.** $4\frac{1}{2} + 2\frac{1}{2}$. **10.** $9\frac{1}{2} - 3$. **12.** $8\frac{1}{2} + 4\frac{1}{2}$.

7. $3\frac{1}{2} + 3\frac{1}{2}$. **9.** $7\frac{1}{2} - \frac{1}{2}$. **11.** $6\frac{1}{2} - 3\frac{1}{2}$. **13.** $8\frac{1}{2} - 4\frac{1}{2}$.
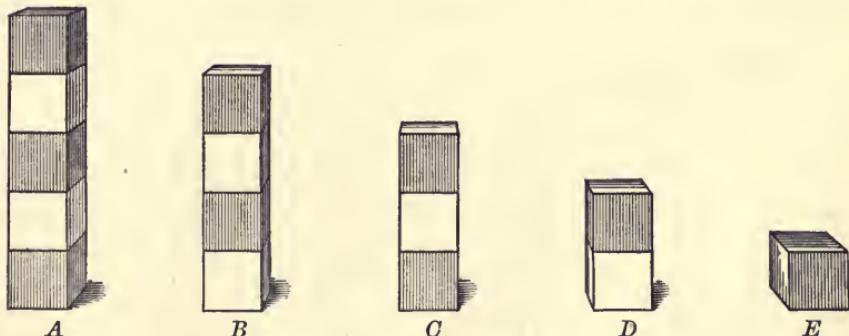
14. Look at the blocks in this picture. D is what part as large as C? D is what part as large as B? D is what part as large as A? C is what part as large as B?
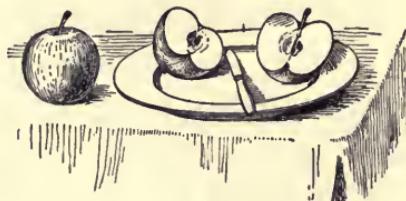
Adding Fractions. If Kate buys two remnants of ribbon, one being $4\frac{2}{3}$ yd. long and the other $2\frac{2}{3}$ yd. long, how many yards of ribbon does she buy?

We see that we must add $4\frac{2}{3}$ yd. and $2\frac{2}{3}$ yd.

We first add the thirds, thus:

$$\frac{2}{3} + \frac{2}{3} = \frac{4}{3} = 1\frac{1}{3}.$$

$$\begin{array}{r} 4\frac{2}{3} \\ 2\frac{2}{3} \\ \hline 7\frac{1}{3} \end{array}$$

We write the $\frac{1}{3}$ in the fractions' column and add the 1 to the ones' column. Then $1 + 2 + 4 = 7$, and we write the 7 in the ones' column.

The sum is $7\frac{1}{3}$, and so Kate buys $7\frac{1}{3}$ yd. of ribbon.

WRITTEN EXERCISE

1. Nora has three pieces of ribbon. The first is $2\frac{1}{3}$ yd. long, the second $1\frac{1}{3}$ yd. long, and the third $4\frac{1}{3}$ yd. long. How many yards has she in all?

2. Fred is making a picture frame that is $9\frac{1}{2}$ in. high and $7\frac{1}{2}$ in. wide. How many inches of molding does he need?

Add the following :

3.	4.	5.	6.	7.	8.
$3\frac{1}{2}$	$2\frac{1}{2}$	$24\frac{1}{3}$	$12\frac{2}{3}$	$16\frac{2}{3}$	$28\frac{1}{3}$
$2\frac{1}{2}$	$4\frac{1}{2}$	$16\frac{1}{3}$	$3\frac{2}{3}$	$14\frac{2}{3}$	$14\frac{2}{3}$
4	$6\frac{1}{2}$	$17\frac{2}{3}$	$4\frac{2}{3}$	$15\frac{2}{3}$	$15\frac{2}{3}$

9.	10.	11.	12.	13.	14.
$2\frac{1}{3}$	$1\frac{1}{2}$	$62\frac{1}{2}$	$39\frac{1}{2}$	$37\frac{1}{3}$	$57\frac{1}{3}$
$3\frac{1}{3}$	7	$17\frac{1}{2}$	$12\frac{1}{2}$	$29\frac{1}{3}$	$22\frac{2}{3}$
2	$3\frac{1}{2}$	12	$33\frac{1}{2}$	16	$33\frac{2}{3}$

Subtracting Fractions. Sue has 12 yd. of cloth. She uses $2\frac{2}{3}$ yd. for a doll's suit. How many yards has she left?

We must subtract $2\frac{2}{3}$ yd. from 12 yd.

We cannot take $\frac{2}{3}$ from nothing, so we think of 12 as $11\frac{3}{3}$, which we can do because $\frac{3}{3} = 1$.

We see that $\frac{3}{3} - \frac{2}{3} = \frac{1}{3}$, and we write the $\frac{1}{3}$ in the fractions' column. Then $11 - 2 = 9$, and we write the 9 in the ones' column.

$$\begin{array}{r} 12 \\ 2\frac{2}{3} \\ \hline 9\frac{1}{3} \end{array}$$

The difference is $9\frac{1}{3}$, and so Sue has $9\frac{1}{3}$ yd. left.

WRITTEN EXERCISE

1. If you have a piece of paper $12\frac{1}{3}$ in. long, and cut off a piece $3\frac{2}{3}$ in. long, how long is the piece that is left?

Why does $12\frac{1}{3} - 3\frac{2}{3}$ have the same result as $11\frac{4}{3} - 3\frac{2}{3}$?

2. If James saws a piece of board $8\frac{1}{2}$ in. long from a piece 24 in. long, how long is the piece that is left?

Subtract the following :

3.	4.	5.	6.	7.	8.
8	6	9	7	18	36
$2\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{3}$	$2\frac{2}{3}$	$5\frac{1}{4}$	$18\frac{3}{4}$

9.	10.	11.	12.	13.	14.
$7\frac{1}{2}$	$6\frac{1}{3}$	$9\frac{1}{3}$	$8\frac{1}{3}$	$16\frac{1}{3}$	$48\frac{1}{3}$
$4\frac{1}{2}$	$2\frac{1}{3}$	$2\frac{2}{3}$	$3\frac{2}{3}$	$8\frac{2}{3}$	$36\frac{2}{3}$

15.	16.	17.	18.	19.	20.
$9\frac{3}{4}$	$9\frac{3}{4}$	$9\frac{1}{4}$	$8\frac{1}{4}$	$15\frac{1}{4}$	$36\frac{1}{4}$
$2\frac{1}{4}$	$2\frac{3}{4}$	$2\frac{3}{4}$	$1\frac{3}{4}$	$2\frac{3}{4}$	$22\frac{3}{4}$

EP

WRITTEN EXERCISE

Add and also subtract, thus making two examples in each case. Time yourself.

1.	2.	3.	4.	5.
$147\frac{2}{3}$	$147\frac{1}{3}$	$628\frac{2}{3}$	$408\frac{1}{3}$	$360\frac{1}{2}$
$29\frac{1}{3}$	$29\frac{2}{3}$	$342\frac{2}{3}$	$299\frac{1}{3}$	$196\frac{1}{2}$

6.	7.	8.	9.	10.
$420\frac{1}{2}$	342	$427\frac{1}{3}$	$326\frac{1}{2}$	$580\frac{1}{3}$
168	$199\frac{1}{2}$	$129\frac{2}{3}$	$129\frac{1}{2}$	$268\frac{2}{3}$

11.	12.	13.	14.	15.
$600\frac{2}{3}$	$509\frac{1}{3}$	$403\frac{1}{3}$	$680\frac{1}{3}$	$959\frac{1}{2}$
$129\frac{1}{3}$	$268\frac{2}{3}$	$227\frac{2}{3}$	273	$548\frac{1}{2}$

16.	17.	18.	19.	20.
$900\frac{1}{2}$	700	600	800	$711\frac{1}{3}$
$548\frac{1}{2}$	$275\frac{1}{2}$	$296\frac{1}{3}$	$127\frac{2}{3}$	$122\frac{2}{3}$

21.	22.	23.	24.	25.
$401\frac{1}{3}$	$300\frac{1}{3}$	911	801	$820\frac{2}{3}$
$67\frac{2}{3}$	$48\frac{2}{3}$	$99\frac{1}{3}$	$27\frac{1}{2}$	$444\frac{1}{3}$

26.	27.	28.	29.	30.
$956\frac{1}{2}$	$808\frac{2}{3}$	$747\frac{2}{3}$	$827\frac{3}{4}$	$720\frac{1}{4}$
$519\frac{1}{2}$	$244\frac{1}{3}$	$245\frac{1}{3}$	$649\frac{1}{4}$	$278\frac{3}{4}$

31.	32.	33.	34.	35.
$601\frac{1}{2}$	$722\frac{1}{3}$	800	$741\frac{1}{2}$	$655\frac{2}{3}$
326	$644\frac{2}{3}$	$235\frac{3}{4}$	$362\frac{1}{2}$	$467\frac{1}{3}$

ORAL EXERCISE

1. One half equals how many fourths?

2. How many small squares in $\frac{3}{4}$ of the large square?

3. How many small squares in the large square? How many fourths make 1?

4. There are 4 qt. in a gallon. What name do we give to a quarter of a gallon?

5. Read and learn: $\frac{2}{4} = \frac{1}{2}$; $\frac{1}{4} + \frac{3}{4} = 1$; $\frac{4}{4} = 1$.

6. By what number do we divide to find one fourth of any number?

7. How many fifths of the circle in the circle? We have seen that we write one fifth thus: $\frac{1}{5}$.

8. Read: $\frac{1}{5}$ and $\frac{1}{5}$ are $\frac{2}{5}$.

9. How much is $\frac{1}{5}$ of the circle and $\frac{4}{5}$ of the circle?

10. Read and learn: $\frac{1}{5} + \frac{4}{5} = 1$; $\frac{5}{5} = 1$.

11. By what number do we divide to find one fifth of any number? to find one eighth of any number?

12. Think one fourth of each of these numbers and then state $\frac{3}{4}$ of each: 8, 16, 20, 24, 12, 40, 28.

13. Think one fifth of each of these numbers and then state $\frac{2}{5}$ of each: 25, 15, 30, 20, 40, 50, 55.

14. Think one sixth of each of these numbers and then state $\frac{5}{6}$ of each: 12, 24, 18, 30, 48, 36, 54, 60, 66.

15. Think one eighth of each of these numbers and then state $\frac{3}{8}$ of each: 16, 24, 40, 56, 80, 48, 32, 64, 88.
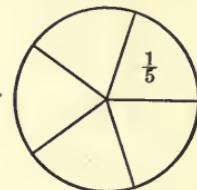
ORAL EXERCISE

1. Write these columns on the board, and add:

3	7	5	8	4	6	9	10	20
3	7	5	8	4	6	9	10	20
3	7	5	8	4	6	9	10	20
3	7	5	8	4	6	9	10	20

2. How much is $\frac{1}{2}$ of 12? $\frac{1}{4}$ of 12? $\frac{3}{4}$ of 12?

3. How much is $\frac{1}{2}$ of 28? $\frac{1}{4}$ of 28? $\frac{3}{4}$ of 28?

4. How much is $\frac{1}{2}$ of 20? $\frac{1}{4}$ of 20? $\frac{3}{4}$ of 20?

5. State the values of:

$\frac{1}{2}$ of 32	$\frac{1}{2}$ of 16	$\frac{1}{2}$ of 24	$\frac{1}{2}$ of 36	$\frac{1}{2}$ of 40
$\frac{1}{4}$ of 32	$\frac{1}{4}$ of 16	$\frac{1}{4}$ of 24	$\frac{1}{4}$ of 36	$\frac{3}{4}$ of 40
$\frac{3}{4}$ of 32	$\frac{3}{4}$ of 16	$\frac{3}{4}$ of 24	$\frac{3}{4}$ of 36	$\frac{3}{4}$ of 80

6. At 32¢ a yard, what will $\frac{3}{4}$ of a yard of cloth cost?

7. At 28¢ a pound, what will $\frac{1}{2}$ of a pound of meat cost?

8. At 36¢ a dozen, what will $\frac{1}{2}$ of a dozen eggs cost?

WRITTEN EXERCISE

1. Build columns of four 12's and four 15's, and add.

Copy and complete the following:

2. $\frac{1}{4}$ of 48 =	**5.** $\frac{1}{2}$ of 44 =	**8.** $\frac{1}{4}$ of 80 =
3. $\frac{1}{2}$ of 48 =	**6.** $\frac{3}{4}$ of 44 =	**9.** $\frac{1}{2}$ of 80 =
4. $\frac{3}{4}$ of 48 =	**7.** $\frac{1}{4}$ of 40 =	**10.** $\frac{3}{4}$ of 88 =

11. To find $\frac{1}{4}$ of a number we divide the number by 4. How much is $\frac{1}{4}$ of 400? $\frac{1}{4}$ of 500? $\frac{1}{4}$ of 600?

ORAL EXERCISE

State the values of :

1. $\frac{1}{2}$ doz. $\frac{1}{4}$ doz. $\frac{1}{3}$ doz. $\frac{1}{6}$ doz. $\frac{1}{12}$ doz.

2. $\frac{3}{4}$ doz. $\frac{2}{3}$ doz. $\frac{5}{6}$ doz. $\frac{5}{12}$ doz. $\frac{7}{12}$ doz.

3. There being 36 inches in 1 yard, state the values of :

   $\frac{1}{6}$ yd. $\frac{1}{3}$ yd. $\frac{1}{4}$ yd. $\frac{1}{9}$ yd. $\frac{1}{2}$ yd.

State the values of :

4. $\frac{1}{2}$ of 4 $\frac{1}{2}$ of 10 $\frac{1}{2}$ of 12 $\frac{1}{2}$ of 20 $\frac{1}{2}$ of 16

5. $\frac{1}{4}$ of 4 $\frac{1}{4}$ of 12 $\frac{1}{4}$ of 16 $\frac{1}{4}$ of 24 $\frac{1}{4}$ of 36

6. $\frac{1}{5}$ of 5 $\frac{1}{5}$ of 20 $\frac{1}{5}$ of 15 $\frac{1}{5}$ of 30 $\frac{1}{5}$ of 50

7. $\frac{1}{3}$ of 6 $\frac{1}{3}$ of 15 $\frac{1}{3}$ of 21 $\frac{1}{6}$ of 12 $\frac{1}{6}$ of 18

8. $\frac{1}{8}$ of 8 $\frac{1}{8}$ of 16 $\frac{1}{8}$ of 32 $\frac{1}{8}$ of 40 $\frac{1}{8}$ of 80

WRITTEN EXERCISE

Write the values of :

1. $\frac{1}{3}$ of 18 $\frac{2}{3}$ of 18 $\frac{1}{3}$ of 21 $\frac{2}{3}$ of 21 $\frac{2}{3}$ of 30

2. $\frac{1}{4}$ of 16 $\frac{3}{4}$ of 16 $\frac{1}{4}$ of 32 $\frac{3}{4}$ of 32 $\frac{3}{4}$ of 40

3. $\frac{1}{5}$ of 25 $\frac{2}{5}$ of 25 $\frac{3}{5}$ of 25 $\frac{3}{5}$ of 50 $\frac{4}{5}$ of 50

4. $\frac{1}{6}$ of 12 $\frac{5}{6}$ of 12 $\frac{1}{6}$ of 18 $\frac{5}{6}$ of 18 $\frac{1}{6}$ of 60

5. $\frac{1}{8}$ of 16 $\frac{3}{8}$ of 16 $\frac{5}{8}$ of 16 $\frac{1}{8}$ of 80 $\frac{5}{8}$ of 80

6. We know that 2 is $\frac{1}{3}$ of 6, that 3 is $\frac{1}{3}$ of 9, and so on. Write five numbers that equal $\frac{1}{3}$ of other numbers.

7. Write five numbers each of which is equal to

$\frac{1}{4}$ of some other number $\frac{1}{5}$ of some other number

$\frac{3}{4}$ of some other number $\frac{2}{5}$ of some other number

WRITTEN EXERCISE

Find the following parts of the numbers given:

1. $\frac{1}{3}$ of 126, $\frac{2}{3}$ of 126.
2. $\frac{1}{3}$ of 330, $\frac{2}{3}$ of 330.
3. $\frac{1}{3}$ of 450, $\frac{2}{3}$ of 450.
4. $\frac{1}{3}$ of 510, $\frac{2}{3}$ of 510.
5. $\frac{1}{3}$ of 639, $\frac{2}{3}$ of 639.
6. $\frac{1}{3}$ of 723, $\frac{2}{3}$ of 723.
7. $\frac{1}{4}$ of 128, $\frac{3}{4}$ of 128.
8. $\frac{1}{4}$ of 224, $\frac{3}{4}$ of 224.
9. $\frac{1}{4}$ of 328, $\frac{3}{4}$ of 328.
10. $\frac{1}{4}$ of 344, $\frac{3}{4}$ of 344.
11. $\frac{1}{4}$ of 524, $\frac{3}{4}$ of 524.
12. $\frac{1}{4}$ of 672, $\frac{3}{4}$ of 672.

13. $\frac{1}{5}$ of 225, $\frac{2}{5}$ of 225.
14. $\frac{3}{5}$ of 225, $\frac{4}{5}$ of 225.
15. $\frac{1}{5}$ of 335, $\frac{4}{5}$ of 335.
16. $\frac{2}{5}$ of 725, $\frac{3}{5}$ of 865.
17. $\frac{1}{6}$ of 336, $\frac{5}{6}$ of 336.
18. $\frac{1}{6}$ of 726, $\frac{5}{6}$ of 726.
19. $\frac{1}{8}$ of 328, $\frac{3}{8}$ of 328.
20. $\frac{5}{8}$ of 328, $\frac{7}{8}$ of 328.
21. $\frac{3}{8}$ of 480, $\frac{5}{8}$ of 488.
22. $\frac{1}{7}$ of 147, $\frac{2}{7}$ of 847.
23. $\frac{3}{7}$ of 287, $\frac{4}{7}$ of 294.
24. $\frac{4}{9}$ of 810, $\frac{5}{9}$ of 720.

25. How do you find $\frac{2}{3}$ of a number? How do you find $\frac{2}{3}$ of 150? $\frac{2}{3}$ of 75? $\frac{2}{3}$ of 300?

26. Frank has 65 marbles and Rob has $\frac{3}{5}$ as many. How many marbles has Rob?

27. If 45 drops of water make a teaspoonful, how many drops of water make $\frac{2}{5}$ of a teaspoonful?

28. Mary uses 10 yd. of cloth in making a dress, and Kate uses $\frac{4}{5}$ as much. How much does Kate use?

29. Fred has a kite string that is 328 ft. long, and Will has one that is $\frac{7}{8}$ as long. How long is Will's kite string?

30. A man has $720 in the bank and draws out $\frac{5}{8}$ of it. How much does he draw out? How much is left?

1. Calling the large rectangle *one,* how many halves do you see in 1?
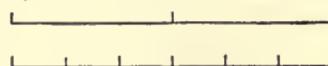
2. How many fourths do you see in $\frac{1}{2}$? in 1?
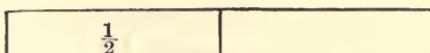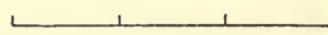
3. How many eighths do you see in $\frac{1}{4}$? in $\frac{1}{2}$? in 1?

4. How many sixths do you see in $\frac{1}{2}$? in 1?

5. $1\frac{1}{2}$ = how many sixths?

6. How many sixths do you see in $\frac{1}{3}$? in $\frac{2}{3}$? in $\frac{3}{3}$?

7. If we have a piece of ribbon $\frac{1}{2}$ yd. long and another piece $\frac{1}{4}$ yd. long, have we enough for trimming a doll's dress that needs a piece $\frac{3}{4}$ yd. long?

We see by the rectangles above that $\frac{1}{2} = \frac{2}{4}$, and so $\frac{1}{2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4}$.

But just as $2\cancel{c} + 1\cancel{c} = 3\cancel{c}$, so $\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$.

So the sum is $\frac{3}{4}$, and we have enough trimming for the doll's dress.

$$\frac{1}{2} = \frac{2}{4}$$
$$\frac{1}{4} = \frac{1}{4}$$
$$\frac{3}{4}$$

In these simple examples for beginners we need not consider the question of loss in sewing the two pieces together.

Looking at the above figures, add or subtract as stated :

8.	9.	10.	11.	12.
$\frac{1}{2} + \frac{1}{4}$	$\frac{1}{4} + \frac{1}{8}$	$\frac{5}{8} - \frac{1}{4}$	$\frac{1}{2} + \frac{1}{8}$	$1 - \frac{1}{8}$
$\frac{1}{2} - \frac{1}{4}$	$\frac{1}{4} - \frac{1}{8}$	$\frac{7}{8} - \frac{1}{4}$	$\frac{1}{2} - \frac{1}{8}$	$1 - \frac{1}{4}$
$\frac{3}{4} - \frac{1}{2}$	$\frac{3}{4} + \frac{1}{8}$	$\frac{7}{8} - \frac{3}{4}$	$\frac{1}{2} - \frac{3}{8}$	$1 - \frac{1}{6}$
$\frac{3}{4} + \frac{1}{2}$	$\frac{3}{4} - \frac{1}{8}$	$\frac{3}{4} - \frac{5}{8}$	$\frac{5}{8} - \frac{1}{2}$	$1 - \frac{1}{3}$

ORAL EXERCISE

1. Express $\frac{1}{2}$ as eighths. To the result add $\frac{3}{8}$.

2. If you are making a bird house and fasten a strip of molding $\frac{3}{8}$ in. thick to a strip of wood $\frac{1}{2}$ in. thick, how thick are the two together?

3. Express $\frac{3}{4}$ as eighths. To the result add $\frac{7}{8}$.

4. If we sew together insertion $\frac{3}{4}$ in. wide and lace $\frac{7}{8}$ in. wide, how wide are the two?

5. Express $\frac{1}{2}$ as eighths. To the result add $\frac{7}{8}$.

6. If you lay a notebook $\frac{1}{2}$ in. thick on a book $\frac{7}{8}$ in. thick, how thick are the two together?

7. How do you add two fractions?

WRITTEN EXERCISE

Add the following:

1. $\frac{1}{2}$, $\frac{1}{2}$.	**6.** $\frac{1}{6}$, $\frac{1}{6}$, $\frac{5}{6}$.	**11.** $\frac{1}{12}$, $\frac{5}{12}$, $\frac{5}{12}$.
2. $\frac{1}{3}$, $\frac{1}{3}$, $\frac{1}{3}$.	**7.** $\frac{1}{10}$, $\frac{3}{10}$.	**12.** $\frac{3}{16}$, $\frac{3}{16}$, $\frac{7}{16}$.
3. $\frac{1}{4}$, $\frac{1}{4}$, $\frac{1}{4}$.	**8.** $\frac{1}{8}$, $\frac{1}{8}$, $\frac{3}{8}$.	**13.** $\frac{3}{16}$, $\frac{5}{16}$, $\frac{7}{16}$.
4. $\frac{1}{5}$, $\frac{1}{5}$, $\frac{2}{5}$.	**9.** $\frac{1}{8}$, $\frac{5}{8}$, $\frac{3}{8}$.	**14.** $\frac{1}{16}$, $\frac{3}{16}$, $\frac{5}{16}$.
5. $\frac{1}{4}$, $\frac{1}{4}$, $\frac{2}{4}$.	**10.** $\frac{1}{10}$, $\frac{3}{10}$, $\frac{7}{10}$.	**15.** $\frac{5}{16}$, $\frac{5}{16}$, $\frac{7}{16}$.

Add, as explained in the oral exercise on page 205:

16. $\frac{1}{2}$, $\frac{1}{4}$.	**20.** $\frac{1}{2}$, $\frac{5}{8}$.	**24.** $\frac{1}{4}$, $\frac{5}{8}$.	**28.** $1\frac{1}{2} + \frac{1}{2}$.
17. $\frac{1}{2}$, $\frac{3}{4}$.	**21.** $\frac{1}{2}$, $\frac{7}{8}$.	**25.** $\frac{1}{4}$, $\frac{7}{8}$.	**29.** $2\frac{1}{2} + \frac{1}{4}$.
18. $\frac{1}{2}$, $\frac{1}{8}$.	**22.** $\frac{1}{4}$, $\frac{1}{8}$.	**26.** $\frac{3}{4}$, $\frac{5}{8}$.	**30.** $7\frac{1}{2} + 3\frac{1}{2}$.
19. $\frac{1}{2}$, $\frac{3}{8}$.	**23.** $\frac{1}{4}$, $\frac{3}{8}$.	**27.** $\frac{3}{4}$, $\frac{7}{8}$.	**31.** $5\frac{1}{4} + 2\frac{3}{4}$.

It is not expected that pupils will be able to reduce the results to lowest terms at this time.

1. If we have $2\frac{1}{2}$ yd. of cloth in one piece and $1\frac{1}{2}$ yd. in another, how much have we in both?

2. If we buy $1\frac{1}{4}$ yd. of one kind of ribbon and $\frac{3}{4}$ yd. of another kind, how much do we buy in all?

Add the following:

3. $3\frac{1}{4} + \frac{1}{4}$.	**8.** $3\frac{1}{4} + \frac{3}{4}$.	**13.** $3\frac{3}{4} + \frac{3}{4}$.
4. $3\frac{3}{4} + 2\frac{3}{4}$.	**9.** $7\frac{3}{4} + 9\frac{3}{4}$.	**14.** $6\frac{3}{4} + 7\frac{3}{4}$.
5. $2\frac{1}{2} + \frac{1}{2}$.	**10.** $2\frac{1}{2} + 3\frac{1}{2}$.	**15.** $3\frac{1}{8} + 2\frac{5}{8}$.
6. $3\frac{1}{8} + 2\frac{7}{8}$.	**11.** $3\frac{3}{8} + 2\frac{7}{8}$.	**16.** $9\frac{5}{8} + 6\frac{7}{8}$.
7. $4\frac{2}{5} + 6\frac{3}{5}$.	**12.** $3\frac{3}{4} + 5\frac{1}{4}$.	**17.** $4\frac{3}{8} + 6\frac{3}{8}$.

18. If a desk is $2\frac{1}{4}$ ft. long and $1\frac{1}{8}$ ft. wide, what is the sum of the length and width of the desk?

Add the following:

19. $2\frac{1}{2} + 1\frac{1}{8}$.	**25.** $2\frac{1}{4} + 1\frac{1}{8}$.	**31.** $4\frac{1}{4} + 1\frac{1}{8}$.
20. $3\frac{1}{2} + 5\frac{1}{8}$.	**26.** $4\frac{1}{2} + 6\frac{1}{8}$.	**32.** $5\frac{1}{4} + 7\frac{1}{2}$.
21. $8\frac{3}{4} + 5$.	**27.** $6\frac{3}{4} + 8\frac{1}{8}$.	**33.** $3\frac{3}{4} + 5\frac{5}{8}$.
22. $4\frac{3}{8} + 6\frac{5}{16}$.	**28.** $7\frac{3}{4} + 2\frac{3}{8}$.	**34.** $6\frac{3}{4} + 7\frac{1}{2}$.
23. $9\frac{3}{5} + 2\frac{2}{3}$.	**29.** $6\frac{1}{8} + 5\frac{3}{4}$.	**35.** $7\frac{7}{8} + 1\frac{3}{4}$.
24. $5\frac{7}{8} + 2\frac{15}{16}$.	**30.** $3\frac{2}{3} + 8\frac{1}{3}$.	**36.** $2\frac{3}{4} + 5\frac{3}{8}$.

37. If you place a board $\frac{5}{8}$ in. thick on a plank that is $1\frac{3}{4}$ in. thick, what is the total thickness?

38. If you place a plank $1\frac{7}{8}$ in. thick on a beam that is $8\frac{3}{4}$ in. thick, what is the total thickness?

Subtraction. 1. In making a picture frame Louis cut a piece of molding $5\frac{3}{8}$ in. long from a piece $8\frac{7}{8}$ in. long. How long was the piece that was left?

We see that $8\frac{7}{8} - 5\frac{3}{8} = 3\frac{4}{8}$.

We know from the pictures on page 209 that $\frac{4}{8} = \frac{1}{2}$, and so $3\frac{4}{8} = 3\frac{1}{2}$. That is, Louis has $3\frac{1}{2}$ in. of molding left.

2. How much picture molding will Louis have left if he takes $2\frac{7}{8}$ in. from 8 in.?

We know that $8 = 7\frac{8}{8}$, because $\frac{8}{8} = 1$.

We see that $7\frac{8}{8} - 2\frac{7}{8} = 5\frac{1}{8}$, and so Louis has $5\frac{1}{8}$ in. left.

3. How much picture molding will Louis have left if he takes $2\frac{3}{4}$ in. from $8\frac{1}{2}$ in.?

We see that $\frac{3}{4}$ is greater than $\frac{1}{2}$, and so we cannot take $\frac{3}{4}$ from $\frac{1}{2}$.

$$\begin{array}{r} 8\frac{1}{2} = 7\frac{3}{2} = 7\frac{6}{4} \\ 2\frac{3}{4} = 2\frac{3}{4} = 2\frac{3}{4} \\ \hline 5\frac{3}{4} \end{array}$$

We see that $8\frac{1}{2} = 7 + 1\frac{1}{2} = 7\frac{3}{2}$.

We know that $\frac{3}{2} = \frac{6}{4}$.

So we can take $2\frac{3}{4}$ from $7\frac{6}{4}$.

The answer is $5\frac{3}{4}$, and so Louis has $5\frac{3}{4}$ in. left.

1. If from 10 yd. of cloth we cut $2\frac{1}{2}$ yd., how much cloth is left?

2. If from 15 yd. of ribbon we cut $5\frac{3}{4}$ yd. and $1\frac{1}{2}$ yd., how much ribbon is left?

Subtract the following :

3. $5\frac{1}{3} - \frac{2}{3}$.   **5.** $5 - 1\frac{1}{2}$.   **7.** $2 - \frac{3}{4}$.   **9.** $7\frac{1}{2} - 5\frac{3}{4}$.

4. $7\frac{3}{8} - \frac{7}{8}$.   **6.** $7 - 3\frac{1}{4}$.   **8.** $5\frac{1}{4} - 3\frac{1}{2}$.   **10.** $8\frac{1}{2} - 4\frac{3}{4}$.

VIII. MEASURES

ORAL EXERCISE

1. How many pints are there in a quart?

2. A pint is what part of a quart?

Liquid Measure. The table of liquid measure is as follows:

$$4 \text{ gills (gi.)} = 1 \text{ pint (pt.)}$$
$$2 \text{ pints} = 1 \text{ quart (qt.)}$$
$$4 \text{ quarts} = 1 \text{ gallon (gal.)}$$

Express the following as pints:

3. 2 qt.	**5.** 5 qt.	**7.** 7 qt.	**9.** 10 qt.
4. 11 qt.	**6.** $\frac{1}{2}$ qt.	**8.** $1\frac{1}{2}$ qt.	**10.** $2\frac{1}{2}$ qt.

Express the following as quarts:

11. 2 pt.	**13.** 4 pt.	**15.** 8 pt.	**17.** 10 pt.
12. 20 pt.	**14.** 1 gal.	**16.** 2 gal.	**18.** 4 gal.

Illustrative Problems. **1.** Express 7 qt. as pints.

Since   1 qt. = 2 pt.,

therefore   7 qt. = 7 × 2 pt., or 14 pt.

2. Express 36 qt. as gallons.

Since   1 qt. = $\frac{1}{4}$ gal.,

therefore   36 qt. = 36 × $\frac{1}{4}$ gal., or 9 gal.

Pupils at this stage of their work are not expected to explain such reductions very elaborately. The above forms are accurate, but a pupil might properly think, for example, that there are 4 qt. in 1 gal., and in 36 qt. there are *as many gallons* as 36 ÷ 4, or 9 gal.

WRITTEN EXERCISE

Express the following as quarts :

1. 75 gal.	**3.** 48 pt.	**5.** 175 gal.	**7.** $\frac{1}{2}$ gal.
2. 145 gal.	**4.** 98 pt.	**6.** 180 pt.	**8.** $1\frac{1}{2}$ gal.

Express the following as gallons :

9. 8 qt.	**11.** 96 qt.	**13.** 168 qt.	**15.** 240 qt.
10. 36 qt.	**12.** 96 pt.	**14.** 168 pt.	**16.** 240 pt.

17. If Martha's mother buys 2 qt. of milk to-day and pays 8 ¢ a quart, how much does the milk cost? How much is she paying for each pint of milk that she buys? How much would a gallon of milk cost?

18. If Mr. Lane, the grocer, buys 60 gal. of vinegar, and puts it up in quart bottles for sale, how many quart bottles can he fill? How many pint bottles could he fill?

19. If the milkman charges 30 ¢ a pint for cream, how much does he charge a quart? If he has a gallon of cream and sells it all, how much does he get for it?

20. If mother buys a gallon of molasses and uses a pint each day in cooking, how long will the molasses last?

21. How many pint bottles can a dealer fill from 75 qt. of milk?

Oral and written work of this kind should be given to show the relations of the parts of each table, one to another. This textbook furnishes plenty of such abstract work, but the teacher may profitably supplement it by home problems made by the class and representing prices in the community.

There should also be given simple exercises in estimating the capacity of boxes, glasses, pitchers, and the like, in the schoolroom.

Time Measure. The table of time is as follows:

$$60 \text{ seconds (sec.)} = 1 \text{ minute (min.)}$$
$$60 \text{ minutes} = 1 \text{ hour (hr.)}$$
$$24 \text{ hours} = 1 \text{ day (da.)}$$
$$7 \text{ days} = 1 \text{ week (wk.)}$$
$$\text{About } 4 \text{ weeks} = 1 \text{ month (mo.)}$$
$$12 \text{ months} = 1 \text{ year (yr.)}$$
$$100 \text{ years} = 1 \text{ century}$$

The days of the week are Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday.

The months of the year and the number of days in each month are as follows:

January, 31 da.	July, 31 da.
February, 28 or 29 da.	August, 31 da.
March, 31 da.	September, 30 da.
April, 30 da.	October, 31 da.
May, 31 da.	November, 30 da.
June, 30 da.	December, 31 da.

Thirty days has September,
April, June, and November.

February has 28 days except in a leap year, when it has 29 days. Until the year 2100, every fourth year is a leap year; that is, 1916, 1920, 1924, and so on, are leap years. Ordinary years have 365 days; leap years have 366 days. There are 52 weeks and 1 day in an ordinary year.

Every morning the teacher should have some of the pupils write on the blackboard the day of the week and the day of the month.

ORAL EXERCISE

1. What month is this? What was last month?

2. What is next month? the month after that?

3. Name the months of the year.

4. Name the days of the week. What day is this?

5. What months have thirty days?

6. How many days are there in this month?

7. What day of the month is this?

8. On what days of the week do you go to school?

The pupil should be taught to understand the calendar, and the calendar for the month should be hung in the schoolroom.

WRITTEN EXERCISE

1. How many days are 5 da. + 2 da.? How many weeks do they make?

2. How many days are 7 da. + 7 da.? How many weeks do they make?

3. How many weeks are 7 da. + 7 da. + 7 da.? How many days in 2 wk.? in 3 wk.?

4. How many seconds are 2 × 30 sec.? How many minutes in 60 sec.? in 120 sec.?

5. How many seconds are 40 sec. + 20 sec.? How many minutes? How many minutes in 360 sec.?

6. How many seconds are 60 sec. + 60 sec.? How many minutes? How many minutes in 600 sec.?

7. How many more days in January than in February of this year?

PROBLEMS WITHOUT NUMBERS

1. How do you multiply by a number of two figures, the right-hand figure being zero?

2. How do you multiply a number representing dollars and cents by a number ending in zero?

3. How do you divide a number ending in zero by a two-figure number ending in zero?

4. If a division is exact, the dividend is the product of what two numbers?

5. How do you check the work in exact division?

6. How do you find a fourth of any number? How do you find three-fourths of the number?

7. How do you find three-fifths of any number?

8. How do you add fourths and eighths? fourths and halves? halves and eighths?

9. If you know how many quarts a can will hold, how do you find the number of pints?

10. If you know the number of gallons a pail will hold, how do you find the number of quarts?

11. How do you change pints to quarts? quarts to gallons?

12. How would you find the number of seconds in an hour? the number of hours in a week?

13. How would you find the number of minutes in a day? in a week? in a year?

14. If you know the cost of milk by the quart, how do you find the cost by the gallon?

IX. REVIEW

WRITTEN REVIEW

1. A fruit train of 19 cars was loaded with oranges. If there were 324 boxes in each car, how many boxes were in the whole train?

2. A bushel of corn weighs 56 lb. How many bushels are there in 1792 lb. of corn?

3. A dealer sold 28 building lots at an average price of $366. How much did he receive for the lots?

4. If 27 typewriters cost a dealer $1701, how much does the dealer pay for each typewriter?

5. If a man spends $48 a year for cigars, how much will he spend for cigars in 25 yr.?

6. A farmer raised 4212 bu. of corn on 78 acres. How many bushels did he raise per acre?

7. If a man earns $3.20 a day, how much will he earn in 28 da.?

8. How many square feet are there in a lot 120 ft. long and 58 ft. wide?

9. How many steel rails each 33 ft. long will be required for 5940 ft. of track? Remember that a track has two lines of rails.

10. In an orchard containing 1440 trees there are 45 rows of trees. How many trees are there in a row?

11. A man saved $1260 in 28 months. How many dollars did he save a month?

WRITTEN REVIEW

Add the following :

1.	2.	3.	4.	5.
2473	2975	$2.75	$12.82	$25.85
4826	8372	3.86	4.96	17.68

6.	7.	8.	9.	10.
3426	5383	$4.75	$32.75	$53.42
4289	2468	2.68	18.26	26.89
2976	9289	3.42	4.98	14.93

Subtract the following :

11.	12.	13.	14.	15.
4012	9235	$7.61	$11.72	$91.26
3746	6842	2.95	6.85	13.41

Multiply or divide as indicated :

16. $17 \times \$2.75$.	**21.** $14,620 \div 37$.	**26.** 228×228.
17. $23 \times \$1.86$.	**22.** $42,836 \div 74$.	**27.** 346×482.
18. $48 \times \$12.62$.	**23.** $53,000 \div 75$.	**28.** 527×693.
19. $56 \times \$27.35$.	**24.** $48,125 \div 25$.	**29.** 648×987.
20. $74 \times \$68.75$.	**25.** $81,348 \div 46$.	**30.** 209×209.

Find the answers to the following :

31. $\frac{2}{3}$ of 162.	**34.** $\frac{4}{5}$ of 275.	**37.** 16 qt. = (?) pt.
32. $\frac{3}{4}$ of 168.	**35.** $\frac{3}{8}$ of 176.	**38.** 16 gal. = (?) qt.
33. $\frac{3}{5}$ of 225.	**36.** $\frac{5}{8}$ of 352.	**39.** 28 da. = (?) wk.

EP

X. USING WHAT YOU HAVE LEARNED

TAKING A TRIP

1. Arthur's father took him on a trip from Indianapolis to Chicago. They left at half past eleven in the morning

and arrived at five in the afternoon. How long were they in taking the trip?

2. It is $109\frac{1}{2}$ miles from Cincinnati to Indianapolis, and $303\frac{3}{4}$ miles from Cincinnati to Chicago. How far is it on the trip that Arthur and his father took to Chicago?

3. If the railroad charged for 195 miles, at 2¢ a mile, how much did Arthur's father pay for a ticket for himself?

4. They bought, for luncheon on the train, 8 sandwiches at 10¢ each, 6 cookies at 10¢ a dozen, and 4 oranges at 5¢ each. How much did the luncheon cost?

5. They left Chicago at 15 min. before one and reached Indianapolis at 6 o'clock. How long did this take?

6. Arthur and his father saw these prices at the lunch counter in the station:

Sandwiches,	10¢	Cookies,	3¢
Coffee,	10¢	Oranges,	6¢
Milk,	10¢	Bananas,	4¢
Oatmeal,	20¢	Apples,	3¢
Bread and milk,	15¢	Pies,	10¢
Cold ham,	25¢	Soup,	20¢
Cold beef,	25¢	Ice Cream,	20¢

From this list select five things that you would like to eat for luncheon, and find the cost.

7. If Arthur's father took 2 sandwiches, a cup of coffee, some cold beef, and an orange, what did his luncheon cost?

Use the above list in Exs. 7, 8, and 9.

8. If Arthur took a sandwich, a glass of milk, a piece of pie, and 2 cookies, how much did his luncheon cost?

9. A man sat beside Arthur and ordered some oatmeal, a cup of coffee, some cold ham, and 2 bananas. How much did his luncheon cost?

10. If Arthur's father paid 75¢ for a drive in a taxi, $1 for two rides in a bus, and 50¢ for delivering a trunk which he brought home, how much did he pay for all?

11. Find the cost of a trip on which a man paid the following: ticket, $2.70; baggage, 50¢; luncheon, 65¢.

12. Find the cost of a trip on which a man paid the following: ticket, $7.60; sleeper, $1.75; dining car, $1.25; porter, 25¢; taxi, $1.25; hotel bill, $12.50.

XI. LITTLE EXAMINATIONS

I. 1. $578 + 296$.　　5. 428×324.　　9. $2568 \div 321$.

2. $\$2.75 + \$3.69$.　6. 509×672.　10. $\frac{1}{4}$ ft. = (?) in.

3. $342 - 196$.　　7. $7344 \div 36$.　11. 60 gal. = (?) qt.

4. 24×86.　　8. XC = (?).　　12. $\frac{1}{3}$ of 729.

II. 1. $983 + 432$.　　5. 286×981.　　9. $2830 \div 283$.

2. $\$4.87 + \$3.73$.　6. 870×392.　10. 1200 ft. = (?) yd.

3. $481 - 296$.　　7. $5304 \div 26$.　11. 60 qt. = (?) gal.

4. 48×94.　　8. LXXI = (?). 12. $\frac{1}{3} + \frac{1}{3} + \frac{1}{3}$.

III. 1. $887 + 556$.　　5. 534×787.　　9. $6084 \div 432$.

2. $\$2.88 + \$1.97$.　6. 508×667.　10. 888 ft. = (?) yd.

3. $513 - 234$.　　7. $3968 \div 31$.　11. 40 pt. = (?) qt.

4. 33×69.　　8. XLI = (?).　12. $\frac{1}{4} + \frac{1}{4}$.

IV. 1. $789 + 987$.　　6. 609×770.　11. 240 min. = (?) sec.

2. $\$4.47 + \$2.89$.　7. $6952 \div 44$.　12. 40 qt. = (?) pt.

3. $812 - 296$.　　8. LXIV = (?). 13. $1 - \frac{5}{6}$.

4. 77×98.　　9. $4500 \div 375$. 14. $\frac{1}{4}$ of 352.

5. 642×889.　10. 360×430. 15. $6087 \div 45$.

V. 1. $276 + 688$.　　6. 783×892.　11. $8536 \div 194$.

2. $\$3.39 + \$2.47$.　7. 340×820.　12. 240 sec. = (?) min.

3. $723 - 465$.　　8. $6336 \div 48$.　13. 4 lb. = (?) oz.

4. 64×39.　　9. XCI = (?).　14. 64 oz. = (?) lb.

5. 680×732.　10. CIX = (?).　15. 300×5280.

Teachers should read the note on page 52.

CHAPTER V

I. READING AND WRITING NUMBERS

ORAL EXERCISE

1. Name the places from right to left as you have learned them in writing a number of five figures.

2. What is the smallest number and the largest number that can be written with five figures?

3. If you add one to 99,999, what is the sum?

4. Read these numbers:

1,000	200,000	125,000	237,630
10,000	300,000	275,000	342,275
100,000	900,000	468,921	407,507

WRITTEN EXERCISE

Write in figures:

1. Seventy-five thousand, sixteen.

2. Two hundred thousand, four hundred six.

3. Five hundred fifty-five thousand, seven.

4. Nine hundred ninety-nine thousand, nine hundred.

Write in words:

5. 125,050.	**7.** 500,005.	**9.** 100,100.
6. 304,004.	**8.** 101,010.	**10.** 123,456.

Million. There is a special name for a thousand thousand. This number is called a *million*, and is written 1,000,000.

We count millions just as we count thousands. That is, 5,000,000 is 5 million, 273,000,000 is 273 million, and 170,050,270 is 170 million, 50 thousand, 270.

For easy reading we separate by commas the figures of a large number into groups of three, always beginning at the right, thus : 175,926,284. All these groups must have three figures, except the left-hand one ; thus :

| 1,275,340 | 30,000,000 | 425,000,723 |
| 21,426,580 | 120,000,000 | 196,481,278 |

The name of the first group at the right is *ones* ; of the second group, *thousands* ; of the third group, *millions*.

ORAL EXERCISE

Read these large numbers :

| 1. 1,253,429 | 28,276,390 | 126,289,000 |
| 2. 2,426,000 | 43,070,001 | 342,428,476 |

WRITTEN EXERCISE

Write in figures :

1. Sixteen million, two thousand, nine.

2. Seventy-one million, five hundred seventy.

3. Sixty-two million, four thousand, six.

4. Four hundred seventy-nine million.

5. Five hundred fifteen million, three hundred.

6. Six million, ninety-three thousand, seventeen.

II. ADDITION

ORAL EXERCISE

To each of the following numbers add 2, 3, 4, 5, 6, 7, 8, and 9, in turn:

1. 27	26	45	74	33	52	21	96
2. 82	83	38	62	17	15	34	61

To each of the following add 10, 11, and 20, in turn:

3. 4	12	49	24	14	23	16	21
4. 7	20	13	38	19	27	66	90

WRITTEN EXERCISE

1. Indiana contains 36,350 square miles; Iowa contains 56,025 square miles; Illinois, 56,650 square miles. What is the combined area of these states?

2. A farmer sells six loads of hay. The first weighs 2430 lb.; the second, 2350 lb.; the third, 2160 lb.; the fourth, 1960 lb.; the fifth, 2140 lb.; the sixth, 1860 lb. How much do the six loads weigh together?

Add the following numbers:

3.	4.	5.	6.
$227.75	$476.68	$883.60	$342.98
184.84	204.69	445.38	38.28
68.09	30.84	268.84	194.45
224.65	26.85	97.25	230.68
80.75	342.68	684.06	49.95

III. SUBTRACTION

ORAL EXERCISE

1. State rapidly the remainders :

37	37	37	37	37	46	52
7	10	17	8	18	18	22

From 92 subtract the following numbers :

2. 10	20	40	52	62	4	7
3. 12	22	42	53	64	14	27

4. Louise spent 64 ¢ for Christmas and Clara spent 32¢. How much more did Louise spend than Clara ?

5. Grandfather is 85 years old and father is 50 years old. How much older than father is grandfather ?

WRITTEN EXERCISE

Subtract and check :

1.	**2.**	**3.**	**4.**
$994.83	$607.64	$813.80	$970.50
538.80	249.89	396.78	448.68

5.	**6.**	**7.**	**8.**
$765.08	$376.30	$940.60	$880.60
259.69	267.95	430.54	479.95

9.	**10.**	**11.**	**12.**
$972.58	$896.20	$878.69	$890.25
348.99	798.43	362.90	86.09

IV. MULTIPLICATION

ORAL EXERCISE

1. Recite the multiplication table of 5's.

2. Recite the multiplication table of 6's.

3. Recite the multiplication table of 7's.

4. Recite the multiplication table of 8's.

5. Recite the multiplication table of 9's.

6. If 1 doz. cans of soup cost $2, what will 42 doz. cans cost? What will 50 doz. cans cost?

7. If 1 doz. jars of meat extract cost $8, what will 30 doz. jars cost? What will 40 doz. jars cost?

8. If 1 doz. cans of lobster cost $3, what will 22 doz. cans cost? What will 33 doz. cans cost?

WRITTEN EXERCISE

Multiply the following :

1. $243 by 22.	11. $924 by 43.	21. $723 by 64.
2. $315 by 73.	12. $672 by 94.	22. $825 by 35.
3. $465 by 54.	13. $941 by 85.	23. $732 by 45.
4. $572 by 25.	14. $682 by 69.	24. $417 by 53.
5. $485 by 62.	15. $617 by 82.	25. $525 by 64.
6. $564 by 47.	16. $426 by 91.	26. $812 by 14.
7. $259 by 57.	17. $324 by 28.	27. $476 by 42.
8. $538 by 38.	18. $416 by 29.	28. $385 by 74.
9. $467 by 59.	19. $675 by 25.	29. $416 by 46.
10. $635 by 92.	20. $530 by 24.	30. $625 by 62.

Three-Figure Multiplier. Mr. Greene bought three farms, the first containing 120 acres; the second, 116 acres; and the third, 102 acres. If he paid $125 an acre for all the land, how much did each farm cost him?

We see that we must find three products, $120 \times \$125$, $116 \times \$125$, and $102 \times \$125$.

We learned on pages 180 and 181 how to multiply by three-figure numbers. Study these three multiplications:

$\$125$	$\$125$	$\$125$
120	116	102
2500	750	250
125	125	125
$\$15000$	125	$\$12750$
	$\$14500$	

We see that the first farm cost $15,000; the second, $14,500; and the third, $12,750.

<center>**WRITTEN EXERCISE**</center>

Multiply the following:

1. 115×136.	8. 161×296.	15. 708×807.
2. 225×475.	9. 314×417.	16. 263×482.
3. 142×387.	10. 180×672.	17. 478×298.
4. 268×491.	11. 201×325.	18. 309×286.
5. 380×662.	12. 208×362.	19. 440×555.
6. 132×390.	13. 405×488.	20. 908×687.
7. 243×487.	14. 507×983.	21. 693×447.

WRITTEN EXERCISE

Multiply the following:

1. $131 \times 427.$	**7.** $362 \times 648.$	**13.** $375 \times 702.$
2. $101 \times 363.$	**8.** $407 \times 942.$	**14.** $406 \times 1475.$
3. $242 \times 787.$	**9.** $387 \times 682.$	**15.** $368 \times 3209.$
4. $303 \times 525.$	**10.** $805 \times 377.$	**16.** $402 \times 2008.$
5. $575 \times 766.$	**11.** $994 \times 782.$	**17.** $498 \times 2007.$
6. $909 \times 999.$	**12.** $809 \times 698.$	**18.** $909 \times 1009.$

19. What will 225 acres of land cost at $125 an acre?

20. A man buys 15 acres of land at $62.50 an acre, and 125 acres at $87.50 an acre. What does all the land cost?

Find the cost of the following:

21. 121 locomotives at $9875 each.

22. 216 passenger cars at $3950 each.

23. 162 yd. of Wilton carpet at $1.65 a yard.

24. 272 yd. of silk at $1.15 a yard; at $1.25 a yard.

25. 112 building lots at $1375 each; at $1250 each.

26. 135 automobiles at $2450 each; at $1875 each.

27. 102 farm wagons at $87.50 each; at $92.25 each.

Multiply the following:

28. $28.75 by 100; by 101; by 106; by 108; by 109.

29. $43.50 by 200; by 207; by 208; by 306; by 309.

30. $67.56 by 400; by 406; by 409; by 403; by 405.

31. $29.30 by 500; by 504; by 507; by 508; by 509.

32. $35.25 by 600; by 609; by 807; by 808; by 987.

V. DIVISION

ORAL EXERCISE

1. How many 10's in 30? in 100? in 700? in 1000?

2. How many 20's in 40? in 400? in 800? in 2000?

3. How many 100's in 300? in 700? in 1000? in 8000?

4. Divide the following:

$500 \div 10$ $500 \div 50$ $500 \div 100$ $500 \div 500$

Divisors Ending in Zeros. To divide 24,000, 24,357, and 25,357 by 2000, we proceed as follows:

$$2\cancel{000})\overline{24\cancel{000}} \qquad 2\cancel{000})\overline{24\cancel{357}} \qquad 2\cancel{000})\overline{25\cancel{357}}$$
$$12 \qquad\qquad 12\tfrac{357}{2000} \qquad\qquad 12\tfrac{1357}{2000}$$

That is, we *cancel* (cross out) the zeros at the right of the divisor and cancel as many figures at the right of the dividend as we cancel zeros of the divisor, writing the complete remainder over the divisor.

Canceling three figures divides by 1000, and because we divide the rest by 2, we really have divided by 2000.

WRITTEN EXERCISE

Divide the following:

1. $6000 \div 300$.

2. $6007 \div 300$.

3. $6107 \div 300$.

4. $60,107 \div 300$.

5. $69,107 \div 300$.

6. $4000 \div 200$.

7. $4009 \div 200$.

8. $4109 \div 200$.

9. $102,107 \div 6000$.

10. $147,111 \div 7000$.

Three-Figure Divisor. To divide 12,525 by 501 we write the numbers in the same way as in other cases of division.

Since $12 \div 5$ is a little more than 2, we see that $1252 \div 501$ is also more than 2, but less than 3.

Since $2 \times 501 = 1002$, we subtract, and there is a remainder of 250 tens.

Since we divided 1252 tens, we write the 2 in the quotient over the tens.

Bringing down the next figure as usual, we have 2505.

$$
\begin{array}{r}
25 \\
501\overline{)12525} \\
1002 \\
\hline
2505 \\
2505 \\
\hline
\end{array}
$$

Since $2505 \div 501 = 5$, we write the 5 as the next figure. The quotient is therefore 25.

Check. $25 \times 501 = 12,525.$

If the quotient figure is taken too large, the partial product will be greater than the corresponding part of the dividend. In this case, try a smaller quotient figure.

If the quotient figure is taken too small, the remainder will be greater than the divisor. In this case, try a larger quotient figure.

WRITTEN EXERCISE

Divide the following :

1. $1284 \div 321.$	**7.** $7398 \div 274.$	**13.** $2250 \div 375.$
2. $5733 \div 273.$	**8.** $3675 \div 525.$	**14.** $7446 \div 219.$
3. $1415 \div 283.$	**9.** $3552 \div 888.$	**15.** $9174 \div 278.$
4. $8450 \div 325.$	**10.** $1926 \div 321.$	**16.** $7896 \div 329.$
5. $9683 \div 421.$	**11.** $3024 \div 432.$	**17.** $8536 \div 388.$
6. $9541 \div 329.$	**12.** $7011 \div 171.$	**18.** $5136 \div 642.$

WRITTEN EXERCISE

Divide the following :

1. $15,000 \div 125$.	18. $84,300 \div 281$.
2. $29,000 \div 125$.	19. $17,000 \div 125$.
3. $17,250 \div 125$.	20. $16,875 \div 125$.
4. $25,984 \div 116$.	21. $29,375 \div 125$.
5. $77,604 \div 116$.	22. $51,736 \div 116$.
6. $86,229 \div 201$.	23. $52,576 \div 212$.
7. $76,708 \div 302$.	24. $28,644 \div 231$.
8. $50,470 \div 245$.	25. $70,512 \div 226$.
9. $93,632 \div 176$.	26. $32,568 \div 236$.
10. $87,143 \div 211$.	27. $79,442 \div 314$.
11. $93,860 \div 247$.	28. $69,834 \div 226$.
12. $91,739 \div 199$.	29. $72,670 \div 215$.
13. $85,158 \div 249$.	30. $79,692 \div 229$.
14. $87,648 \div 249$.	31. $82,450 \div 194$.
15. $87,318 \div 231$.	32. $79,808 \div 232$.
16. $91,791 \div 217$.	33. $78,200 \div 184$.
17. $65,649 \div 237$.	34. $69,687 \div 267$.

35. If 98 machines cost \$34,594, what is the cost of each machine ?

36. If 175 tons of hay cost \$2975, what is the cost of the hay per ton ?

37. If 405 sewing machines cost a dealer \$14,175, how much did he pay for each machine?

VI. MEASURES

ORAL EXERCISE

1. How many inches in 1 ft. ? in $\frac{1}{2}$ ft. ?

2. How many feet in 1 yd. ? in $\frac{1}{3}$ yd. ? in $1\frac{1}{3}$ yd. ?

3. There is a measure called the *rod*. It is $16\frac{1}{2}$ ft. long. How much does this lack of being 20 ft. ? It is how much more than 15 ft. ? _____

Length. The following is the table of length :

$$12 \text{ inches (in.)} = 1 \text{ foot (ft.)}$$
$$3 \text{ feet} = 1 \text{ yard (yd.)}$$
$$16\frac{1}{2} \text{ feet} = 1 \text{ rod (rd.)}$$
$$5280 \text{ feet} = 320 \text{ rods} = 1 \text{ mile (mi.)}$$

The teacher should assist the pupils to visualize these basal units. In cities the number of blocks to the mile, the number of feet or rods in the width of the streets, and the average size of building lots should be known. In the country the rod and the mile are of particular importance in measuring the size of fields and the distance to the village.

WRITTEN EXERCISE

1. How many feet in 3 yd. ? How many inches ?

2. How many feet in $\frac{1}{2}$ mi.? in $\frac{1}{4}$ mi.? in $\frac{1}{8}$ mi.?

3. How many rods in $\frac{1}{2}$ mi. ? in $\frac{1}{4}$ mi.? in $\frac{1}{8}$ mi. ?

4. How many inches in 1 yd.? in 1 rd.? in 1 mi.?

5. How many miles in 640 rd.? in 5440 rd.?

6. How many yards in 792 ft.? in 1065 ft.?

ORAL EXERCISE

1. Estimate the length and the width of this room.

2. How high is the chalk rack from the floor?

3. How high do you think the door is?

4. How wide do you think the street is in front of the schoolhouse?

5. How many inches do you step in taking a long step?

6. Tell some place that is about a mile from the schoolhouse.

Teachers should make sure that the pupils have a definite idea of the value of each item in the various tables, and should fix these ideas of values by frequent reviews and drills in which the words are used concretely. They should use the blackboard, the schoolroom floor, and the school yard to illustrate distances and areas. The pupils should learn to pace distances. The distance from the school to some well-known point should be fixed as a standard mile to which the pupils can refer in making estimates. Much practice in estimating should be given, and the estimates should be followed by actual measurements.

WRITTEN EXERCISE

1. Find the number of ounces in 14 lb.

2. Find the number of pounds in 98 oz.

3. Find the number of quarts in 17 gal.

4. Find the number of gallons in 17 qt.

5. Find the number of pecks in 28 bu.

6. Find the number of bushels in 28 pk.

7. If you weigh 52 lb., how many ounces do you weigh?

8. If a street is 66 ft. wide, what is its width in yards?

1. A square is 3 ft. on a side ; what is the area ?

2. What is the area of a square that is 12 in. on a side ?

3. How many feet in 1 yd.? Then 1 ft. is what part of 1 yd.? How many square feet in 1 sq. yd.?

Square Measure. The following is the table of square measure :

144 square inches (sq. in.) = 1 square foot (sq. ft.)

9 square feet = 1 square yard (sq. yd.)

30¼ square yards = 1 square rod (sq. rd.)

160 square rods = 1 acre (A.)

640 acres = 1 square mile (sq. mi.)

In the country special care should be taken to visualize the acre by pointing out fields that contain an acre or a definite number of acres. The teacher should review page 151 at this time.

1. How many times is 9 sq. ft. contained in 144 sq. ft.? How many square yards in 144 sq. ft.?

2. How many square yards in an oblong 30 yd. long and 8 yd. wide ? Draw the figure, using ¼ in. to a yard.

We speak of such a rectangle as being 8 yd. by 30 yd. in size.

Find the areas of the following rectangles :

3. 32 ft. by 52 ft.   **6.** 19 yd. by 37 yd.

4. 58 yd. by 63 yd.   **7.** 43 ft. by 98 ft.

5. 16 ft. by 121 ft.   **8.** 69 ft. by 248 ft.

EP

1. If you were to speak of the length of your state, would you speak of it by miles or by feet?

2. If you were to measure your schoolroom, would you measure by miles, or by feet, or by inches?

3. If you were to measure your finger, would you measure by yards, or by feet, or by inches?

4. If asked your age, would you answer in years or in weeks? If asked how long before you go home to-day, how would you answer? _____

Unit of Measure. When we measure anything by feet we call the foot the *unit of measure*. So if we measure weight by the pound, the pound is the unit of measure.

In measuring great lengths we use the mile as the unit. For lengths less than 1 mi. we often use the rod or the yard. For short lengths we often use the foot or the inch.
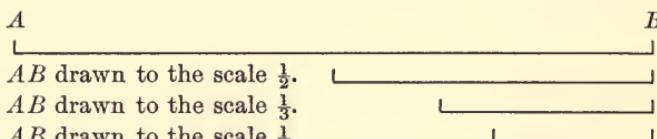
1. Measure the length of the room, using 1 ft. as the unit; using 1 yd. as the unit.

2. Measure the length of the desk, using 1 ft. as the unit; using 1 in. as the unit.

3. Measure the height of the desk, using 1 ft. as the unit; using 1 in. as the unit.

4. Imagine a square 36 in. on a side. Find its area, using 1 sq. ft. as the unit; also using 1 sq. yd. as the unit; also using 1 sq. in. as the unit.

DRAWING TO SCALE

1. If we draw a picture of a doll's house, and make it $\frac{1}{4}$ as long and $\frac{1}{4}$ as high as the house, we say that we draw the picture *to the scale* of 1 to 4, or to the scale $\frac{1}{4}$.

Every inch in length is then represented by $\frac{1}{4}$ in.

We may draw to other scales. If we represent 1 ft. by 1 in., we say that we draw to the scale of 1 in. to 1 ft. Since there are 12 in. in 1 ft. we also say that we draw to the scale of 1 to 12, writing this as the scale $\frac{1}{12}$.

A B

The line AB drawn to the scale $\frac{1}{2}$.

The line AB drawn to the scale $\frac{1}{3}$.

The line AB drawn to the scale $\frac{1}{4}$.

2. If we draw to the scale $\frac{1}{2}$, by what length shall we represent a line 4 in. long?

3. If we draw to the scale $\frac{1}{3}$, by what length shall we represent a line 12 in. long? a line 15 in. long?

4. If we draw to the scale $\frac{1}{4}$, by what length shall we represent a line 40 in. long? a line 36 in. long?

5. Draw a line to the scale $\frac{1}{4}$ to represent 16 in.

*Draw lines to the given scales to represent these lengths :*

6. 10 in., $\frac{1}{2}$.	**9.** 24 in., $\frac{1}{4}$.	**12.** 20 in., $\frac{1}{10}$.
7. 15 in., $\frac{1}{3}$.	**10.** 24 in., $\frac{1}{3}$.	**13.** 30 in., $\frac{1}{15}$.
8. 12 in., $\frac{1}{4}$.	**11.** 24 in., $\frac{1}{6}$.	**14.** 36 in., $\frac{1}{9}$.

We frequently write 4′ for 4 ft., 4″ for 4 in., 4′ 8″ for 4 ft. 8 in., and so on.

**1.** Here is a rectangle $2''$ long by $1''$ wide. It is divided into eight squares, each of which is $\frac{1}{2}''$ on a side.

If we make a drawing of this rectangle, making each line half as long as it is here, we have the lower rectangle. We then say that we have drawn the rectangle to the scale $\frac{1}{2}$, or 1 to 2, or $1''$ to $2''$.
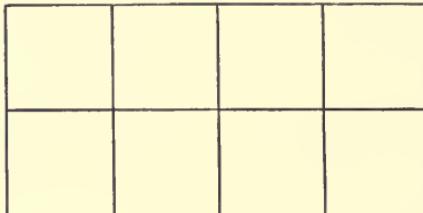
2. A plan of a box lid is drawn to the scale $\frac{1}{2}$. The drawing is $4''$ long. What is the length of the box lid?
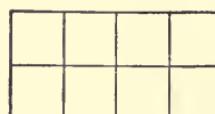
3. In a plan of a room the scale is $1''$ to $1'$. The plan is $14''$ by $16''$. What is the size of the room?

4. A drawing is made of a leaf of a notebook. The drawing is $2''$ by $3''$ and the scale is $\frac{1}{3}$. What are the dimensions of the leaf?

5. A drawing is made of the cloth back used in binding a book. The drawing is $1''$ by $3''$ and the scale is $\frac{1}{3}$. What are the dimensions of the cloth?

1. Make the drawing mentioned above in Ex. 2.

2. Make the drawing mentioned above in Ex. 3.

3. Make the drawing mentioned above in Ex. 4.

4. Make the drawing mentioned above in Ex. 5.

WRITTEN EXERCISE

Find the areas of the following rectangles :

1. 6 ft. by 17 ft.
2. 12 ft. by 27 ft.
3. 21 in. by 53 in.
4. 12 yd. by 25 yd.
5. 26 yd. by 48 yd.
6. 22 yd. by 75 yd.
7. 23 rd. by 75 rd.

8. 19 ft. by 72 ft.
9. 32 in. by 47 in.
10. 67 in. by 82 in.
11. 33 yd. by 47 yd.
12. 54 ft. by 96 ft.
13. 29 in. by 38 in.
14. 43 mi. by 62 mi.

15. Draw a picture of a square 2 ft. on a side, using $\frac{1}{2}$ in. to represent a foot.

This is called drawing to a scale of $\frac{1}{2}$ in. to 1 ft.

16. Draw a picture of a rectangle 2 yd. wide and 3 yd. long, on a scale of 1 in. to the yard.

17. It is 32 in. around a square. What is the length of each side? How many square inches does the square contain?

18. A farmer has a field 40 rd. long and 16 rd. wide. How many square rods does it contain?

19. A sidewalk is 95 ft. long and 5 ft. wide. How many square feet of area in the walk?

20. A garden is 14 rd. long and 7 rd. wide. What is its area in square rods?

If the class has not learned the meaning of right angle, acute angle, and obtuse angle, these should be explained before proceeding to page 240. The terms "horizontal," "vertical," and "perpendicular" should also be explained at this time.

1. Which of these three triangles has an obtuse angle?
What kind of a triangle is it?

2. Which of these triangles has a right angle? Point to
the right angle. What kind of a triangle is it?

3. In which of the triangles are all of the angles acute?
What kind of a triangle is it?

4. What kind of a triangle can you make with three
narrow strips of paper 3 in., 4 in., and 5 in. long?

Triangles. A triangle having a right angle is a *right
triangle*.

A triangle having an obtuse angle is an *obtuse triangle*.

A triangle having three acute angles is an *acute triangle*.

The pupils should have plenty of practice in drawing these figures.

1. How far is it around a triangle whose sides are 14 ft.,
12 ft., and 12 ft.?

2. Draw any acute triangle with two of its sides 2 in.
and 3 in. Measure the third side and find how far it is
around the triangle.

3. Draw a right triangle with the shortest side $1\frac{1}{2}$ in., and
the next longer side 2 in. Measure and find the length of
the longest side.

1. How many cubic inches are there in a block 1 in. long, 1 in. wide, and 1 in. high?

2. How long is the edge of a cube which contains 1 cu. in.? How long is the edge of a cube which contains 1 cu. ft.?
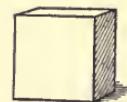
We write cu. in. for cubic inches and cu. ft. for cubic feet.

3. How many cubic inches are there in a block 3 in. long, 1 in. wide, and 1 in. high?

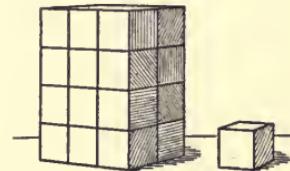The teacher should use three 1-inch cubes, or should draw the figure.

4. How many cubic inches are there in a block 3 in. long, 2 in. wide, and 1 in. high?

The teacher should use six 1-inch cubes, or should draw the figure.

5. How many cubic inches are there in a block 3 in. long, 2 in. wide, and 4 in. high?

Since a block 1 in. long, 1 in. wide, and 1 in. high contains 1 cu. in., a block 3 times as long contains 3 × 1 cu. in., or 3 cu. in., and a block 2 times as wide contains 2 × 3 cu. in., or 6 cu. in., and a block 4 times as high contains 4 × 6 cu. in., or 24 cu. in. That is,

$$2 \times 3 \times 4 \text{ cu. in.} = 24 \text{ cu. in.}$$

**6.** How many cubic inches are there in a block 3 in. long, 2 in. wide, and 2 in. high?

The teacher should see that the pupils understand informally the meaning of the words *cube, solid, volume,* and *dimensions,* and should state to the class that the blocks and boxes which we shall measure have square corners. Such a long term as *rectangular solid* need not be used at this time.

1. The cube *A* is how many times the block *B*?

2. The block *B* is how many times the cube *C*?

3. A cube that is 3 ft. on an edge is how many times as large as a cube that is 1 ft. on an edge?

4. How many feet in 1 yd.? Then how many cubic feet in 1 cubic yard?

5. How would you find the number of cubic inches in 1 cu. ft. ? Multiply on the blackboard and find this number.
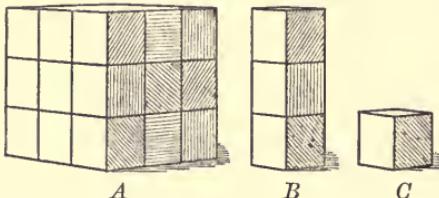
Cubic Measure. The following is the table of cubic measure :

1728 cubic inches (cu. in.) = 1 cubic foot (cu. ft.)
27 cubic feet = 1 cubic yard (cu. yd.)

WRITTEN EXERCISE

1. A bin is 3 ft. by 5 ft. by 2 ft. It holds how much more than 1 cu. yd.?

2. A box is 8 in. by 20 in. by 10 in. It holds how much less than 1 cu. ft.?

3. How many cubic yards in a bin 6 ft. by 9 ft. by 3 ft.?

Find the volume of solids whose dimensions are :

4. 12 in., 19 in., 14 in.   **6.** 6 ft., 138 ft., 2 ft.

5. 27 in., 43 in., 32 in.   **7.** 2 yd., 698 yd., 1 yd.

ORAL EXERCISE

1. How many cubic feet in 10 cu. yd. ?

2. How many cubic yards in a cellar 5 yd. by 10 yd. by 2 yd. ? in a cellar 4 yd. by 5 yd. by 3 yd. ?

3. How many cubic inches in a box 3 in. by 4 in. by 5 in. ? in a box 4 in. by 5 in. by 7 in. ?

4. How many cubic inches in a cube 2 in. on an edge ?

*State the volume of boxes of the following dimensions :*

5. 2 in., 3 in., 5 in.	**9.** 4 in., 5 in., 6 in.
6. 3 in., 4 in., 10 in.	**10.** 5 in., 7 in., 6 in.
7. 2 in., 5 in., 10 in.	**11.** 4 in., 5 in., 10 in.
8. 2 in., 4 in., 6 in.	**12.** 3 in., 5 in., 10 in.

WRITTEN EXERCISE

1. How many cubic inches in an aquarium 16 in. long, 8 in. wide, and 9 in. deep ?

2. How many cubic feet in a wall 36 ft. long, 30 ft. wide, and 2 ft. thick ?

3. A cistern is 6 ft. square at the bottom and 5 ft. deep. How many cubic feet of water will it contain ?

4. A water tank is 8 ft. long, 6 ft. wide, and 4 ft. deep. How many cubic feet of water will it contain ?

5. A cellar is to be dug 19 ft. by 25 ft. by 6 ft. How many cubic feet of earth must be taken out ?

6. A coal bin is 22 ft. long, 15 ft. wide, and 7 ft. deep. How many cubic feet of coal will it contain ?

1. This boy is 4 ft. tall. Estimate the dimensions of this woodpile. Do you know the name of this amount of wood?
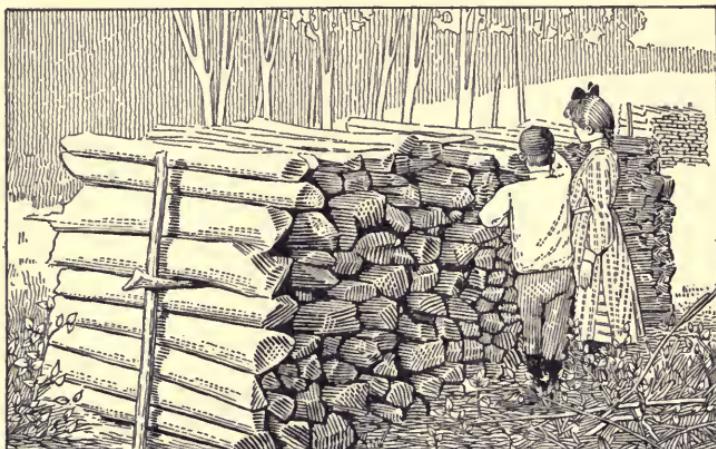
2. A pile of wood is 8 ft. long, 4 ft. wide, and 4 ft. high. How do you find the number of cubic feet it contains?

Read and learn this table:

128 cubic feet = 1 cord (cd).

Wood is sold by the cord. Stand 8 ft. from the front of the room and 4 ft. from the side, and hold your hand 4 ft. from the floor, so as to show the size of a cord.

3. How much will 9 cd. of wood cost at $4 a cord?

4. How much will 7 cd. of wood cost at $5 a cord?

5. How many cords of wood in a pile 16 ft. long, 4 ft. wide, and 8 ft. high?

1. Meat is sold by the pound. Candy is sold by the pound. Pepper is sold by the ounce. Do you know how coal is sold? Do you know how hay is sold?

2. Can you name anything else that is sold by the ounce? by the pound? by the ton?

3. How many ounces are there in a pound? How many pounds in a ton?

Weight. The following is the table of weight:

16 ounces (oz.)=1 pound (lb.)

2000 pounds =1 ton (T.)

The ton is used in weighing substances sold in heavy loads, like coal, hay, building stone, and iron.

1. At $12.75 a ton, what will 17 T. of hay cost?

2. At $5.50 a ton, what will 34 T. of coal cost?

3. At $36.60 for 6 T., what will 1 T. of coal cost?

4. When coal is worth $7.25 a ton, what will 9 T. cost?

5. When hay is worth $13.25 a ton, what will 7 T. cost? 14 T.? 19 T.? 28 T.? 37 T.? 49 T.?

6. What will 17 T. of coal cost at $4.75 a ton?

7. What will 26 T. of coal cost at $4.95 a ton? at $5.30 a ton? at $5.80 a ton? at $6.25 a ton?

8. What does hay cost a ton when 9 T. cost $116.10?

9. What is hay worth when 21 T. cost $270.90?

VII. USING WHAT YOU HAVE LEARNED

A BOY SCOUT CLUB

1. These Boy Scouts earned the money for their uniforms. The hats cost $1.15 each, the coats $1.25, the trousers $1, the leggings 55¢, and the shirts $1. Find the cost of the suits for the five boys shown in the picture.

2. The patrol leader decided to add to his outfit a belt at 40¢, a canteen at 50¢, and a haversack at 75¢. He handed the salesman a $2 bill. What change was due?

3. For their hikes they bought a stewpan at 80¢, a water pail at 25¢, a coffeepot at 60¢, and a ring stand at 20¢. How much did they pay for all these?

4. For luncheon one day they took Frankfurters at 30¢, buns at 18¢, mustard at 5¢, pie at 20¢, and 2 qt. of milk at 8¢ a quart. Each boy paid 10¢ for car fares. How much did the five boys pay in all?

GOING TO SCOUT CAMP

1. The patrol of a Scout company consists of 8 boys.
They raised money by an entertainment to go into camp
for two weeks. They took in $62.40, and their expenses
were $4.80. How much was left for going to camp? What
was each boy's share? How much more must each boy
earn to start out with $12?

2. Each boy's expenses were as follows: railway fare,
$1.04; fare on the boat, $1; street car, 15¢; meals, going
and returning, 78¢; camp fee, $7.84. What was the total
cost for each boy? What was the total cost for the patrol?

3. If each boy started with $15, how much had he left for
spending money after paying his share as found in Ex. 2?

4. One boy lost a $5 bill on the way to camp. You
have found in Ex. 2 the total cost for each boy. Now tell
how much he must borrow from the others to make up
his expenses.

5. One of the boys became ill and had to return home
at the end of a week. How much should he receive back
on his camp fee?

6. There were 84 boys in camp. If the fee of each was
$7.84, what was the total amount paid in camp fees?

7. The boys walked $3\frac{3}{4}$ mi. from the station to the camp
grounds at Scout pace, which is 1 mi. in 12 min. How long
did it take to go this distance?

Find 3×12 min., then $\frac{3}{4}$ of 12 min., and then add the results.

8. If a patrol starts on a hike at 15 min. before 10 and
returns at 10 min. after 12, how long are the boys out?

VIII. FRACTIONS

Terms of a Fraction. To take $\frac{3}{8}$ of this rectangle, we divide the rectangle into 8 equal parts and take 3 of these parts.

In the fraction $\frac{3}{8}$, the number 3 is called the *numerator*, and it tells how many equal parts we take.

In the same fraction 8 is called the *denominator*, and it tells the number of equal parts into which the rectangle has been divided.

$$\frac{3}{8} = \frac{\text{numerator}}{\text{denominator}}$$
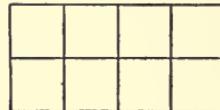
The numerator and denominator are called the *terms* of the fraction. The terms of the fraction $\frac{3}{8}$ are 3 and 8.

A whole number, like 2, 7, or $10, is called an *integer*.

An integer and a fraction together are called a *mixed number*; as $2\frac{1}{2}$, $4\frac{3}{4}$.

A fraction that is less than 1 is called a *proper fraction*; as $\frac{1}{2}$, $\frac{3}{4}$, $\frac{2}{5}$.

A fraction that is equal to 1 or greater than 1 is called an *improper fraction*; as $\frac{4}{4}$, $\frac{5}{5}$, $\frac{5}{4}$, $\frac{15}{8}$.

We see that we can write improper fractions as whole numbers or as mixed numbers. For example,

$$\frac{4}{4} = 1 \qquad \frac{5}{4} = 1\frac{1}{4} \qquad \frac{5}{5} = 1 \qquad \frac{6}{5} = 1\frac{1}{5} \qquad \frac{6}{6} = 1 \qquad \frac{7}{6} = 1\frac{1}{6}$$

This work in fractions covers what is usually given in Grade IV. It is slightly more extended than that required by the minimum course of study in some places and may, therefore, be shortened if the teacher desires. It is given in this form so that teachers who wish the material need not go outside the textbook to find it.

ORAL EXERCISE

			4
		4	4
	4	4	4
4	4	4	4
$\overline{4}$	$\overline{8}$	$\overline{12}$	$\overline{16}$

			5
		5	5
	5	5	5
5	5	5	5
$\overline{5}$	$\overline{10}$	$\overline{15}$	$\overline{20}$

			6
		6	6
	6	6	6
6	6	6	6
$\overline{6}$	$\overline{12}$	$\overline{18}$	$\overline{24}$

			7
		7	7
	7	7	7
7	7	7	7
$\overline{7}$	$\overline{14}$	$\overline{21}$	$\overline{28}$

If we look at these columns and the sums, we see that 4 is $\frac{1}{2}$ of 8, 12 is $\frac{3}{4}$ of 16, and so on.

Point to the columns representing the following numbers, and tell the answers in all cases :

1. 10, $\frac{1}{2}$ of 10, $\frac{3}{2}$ of 10.

2. 15, $\frac{1}{3}$ of 15, $\frac{2}{3}$ of 15.

3. 14, $\frac{1}{2}$ of 14, $\frac{3}{2}$ of 14, $\frac{4}{2}$ of 14.

4. 21, $\frac{1}{3}$ of 21, $\frac{2}{3}$ of 21, $\frac{4}{3}$ of 21.

5. 28, $\frac{1}{4}$ of 28, $\frac{2}{4}$ (or $\frac{1}{2}$) of 28, $\frac{3}{4}$ of 28.

6. 12, $\frac{1}{3}$ of 12, $\frac{2}{3}$ of 12, $\frac{1}{2}$ of 12.

7. 18, $1\frac{1}{3}$ times 18, $\frac{1}{3}$ of 18, $\frac{2}{3}$ of 18.

8. Think of $\frac{1}{3}$ of each of the following numbers, and then state $\frac{2}{3}$ of each :

    9   6   12   3   21   30   33   36

9. Think of $\frac{1}{4}$ of each of the following numbers, and then state $\frac{3}{4}$ of each :

    32   40   12   24   20   28   36   44

ORAL EXERCISE

1. How much is $\frac{1}{3}$ of 12? $\frac{2}{3}$ of 12?

2. How much is $\frac{1}{5}$ of 20? $\frac{2}{5}$ of 20? $\frac{3}{5}$ of 20?

3. How much is $\frac{1}{6}$ of 12? $\frac{3}{6}$ of 12? $\frac{1}{2}$ of 12?

Find $\frac{1}{3}$, and then $\frac{2}{3}$, of the following:

4. 18.　　**5.** 15.　　**6.** 24.　　**7.** 39.　　**8.** 33.　　**9.** 60.

Find $\frac{1}{5}$, and then $\frac{2}{5}$, of the following:

10. 15.　　**11.** 25.　　**12.** 35.　　**13.** 45.　　**14.** 50.　　**15.** 55.

WRITTEN EXERCISE

1. Find $\frac{1}{5}$ of 75, and then find $\frac{2}{5}$ of 75.

2. Find $\frac{1}{6}$ of 72, and then find $\frac{5}{6}$ of 72.

3. Find $\frac{1}{3}$ of 81, and then find $\frac{2}{3}$ of 81.

Find $\frac{1}{3}$, and then $\frac{2}{3}$, of the following:

4. 27.　　**5.** 45.　　**6.** 63.　　**7.** 42.　　**8.** 54.　　**9.** 66.

Find $\frac{1}{5}$, and then $\frac{3}{5}$ and $\frac{4}{5}$, of the following:

10. 65.　　**11.** 30.　　**12.** 85.　　**13.** 40.　　**14.** 80.　　**15.** 95.

Using a ruler, or the edge of a piece of paper on which inches have been marked, draw lines of the following lengths, and then mark off the parts stated:

16. 2 in., $\frac{3}{4}$ of 2 in.

17. $1\frac{1}{2}$ in., $\frac{2}{3}$ of $1\frac{1}{2}$ in.

18. $2\frac{1}{2}$ in., $\frac{2}{5}$ of $2\frac{1}{2}$ in.

19. $1\frac{1}{4}$ in., $\frac{3}{5}$ of $1\frac{1}{4}$ in.

20. $2\frac{1}{4}$ in., $\frac{1}{3}$ of $2\frac{1}{4}$ in.

21. $4\frac{1}{2}$ in., $\frac{2}{3}$ of $4\frac{1}{2}$ in.

ORAL EXERCISE

1. How many fourths of a square in 1 square? How many fourths of an apple in 1 apple? How many fourths in 1?

$\frac{1}{4}$	$\frac{1}{4}$
$\frac{1}{4}$	$\frac{1}{4}$

2. How many fourths of a square in $\frac{1}{2}$ of the square? How many fourths of anything in $\frac{1}{2}$ of it? in $\frac{2}{8}$ of it? in $\frac{4}{8}$ of it?

3. How much is $\frac{1}{8}$ of 24? $\frac{4}{8}$ of 24? $\frac{1}{2}$ of 24? How does $\frac{4}{8}$ compare with $\frac{1}{2}$? with $\frac{2}{4}$?

4. How do you find $\frac{1}{8}$ of a number? Then how do you find $\frac{7}{8}$ of it? $\frac{4}{8}$ of it? Is there any easier way of finding $\frac{4}{8}$ of a number?

5. How much is $\frac{1}{8}$ of 16? $\frac{4}{8}$ of 16? $\frac{1}{2}$ of 16?

6. How much is $\frac{1}{8}$ of 48? $\frac{4}{8}$ of 48? $\frac{1}{2}$ of 48?

7. How much is $\frac{1}{6}$ of 36? $\frac{3}{6}$ of 36? $\frac{1}{2}$ of 36?

8. Which will buy the more candy, a half dollar, two quarters, or five dimes? Why is this?

WRITTEN EXERCISE

Draw lines and divide them into parts to show that:

1. $\frac{1}{4} = \frac{2}{8}$.	**4.** $\frac{3}{6} = \frac{1}{2}$.	**7.** $\frac{4}{10} = \frac{2}{5}$.	**10.** $\frac{8}{10} = \frac{4}{5}$.
2. $\frac{6}{8} = \frac{3}{4}$.	**5.** $\frac{1}{3} = \frac{2}{6}$.	**8.** $\frac{5}{10} = \frac{1}{2}$.	**11.** $\frac{4}{12} = \frac{1}{3}$.
3. $\frac{4}{6} = \frac{2}{3}$.	**6.** $\frac{1}{2} = \frac{3}{6}$.	**9.** $\frac{6}{10} = \frac{3}{5}$.	**12.** $\frac{6}{12} = \frac{1}{2}$.

Draw squares and divide them into parts to show that:

13. $\frac{1}{2} = \frac{2}{4}$.	**15.** $\frac{1}{2} = \frac{4}{8}$.	**17.** $\frac{1}{4} = \frac{2}{8}$.	**19.** $\frac{3}{4} = \frac{6}{8}$.
14. $\frac{2}{2} = \frac{4}{4}$.	**16.** $\frac{2}{2} = \frac{8}{8}$.	**18.** $\frac{2}{4} = \frac{4}{8}$.	**20.** $\frac{4}{4} = \frac{8}{8}$.

EP

ORAL EXERCISE

1. Look at figure *A* and state how many sixths you see in one half.

2. Look at figure *B* and state how many eighths you see in one half ; in three quarters.

3. Look at figure *C* and state how many tenths you see in one half ; in one fifth ; in four fifths.
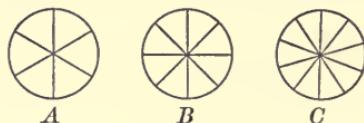
Reduction. We see that $\frac{2}{4}$ can be obtained from $\frac{1}{2}$ by multiplying both terms by 2, and that $\frac{1}{2}$ can be obtained from $\frac{5}{10}$ by dividing both terms by 5. That is,

Both terms of a fraction may be multiplied by the same number without changing the value of the fraction.

Both terms of a fraction may be divided by the same number without·changing the value of the fraction.

When we change the value of the terms without changing the value of a fraction we *reduce* the fraction.

When both terms cannot be divided by the same number, the fraction is said to be *in lowest terms.*

To reduce a fraction to lowest terms, divide by the largest number that will divide both terms without a remainder.

$$\frac{8}{12} = \frac{8 \div 4}{12 \div 4} = \frac{2}{3}, \text{ lowest terms.}$$

In this example, 4 is said to be *canceled* from both terms when the work is written as here shown.

$$\frac{\overset{2}{\cancel{8}}}{\underset{3}{\cancel{12}}} = \frac{2}{3}$$

WRITTEN EXERCISE

1. Reduce the following fractions to halves :

$\frac{2}{4}$ $\frac{4}{8}$ $\frac{8}{8}$ $\frac{12}{8}$ $\frac{16}{8}$ $\frac{24}{8}$ $\frac{32}{8}$ $\frac{40}{8}$

2. Reduce the following fractions to fourths :

$\frac{1}{2}$ $\frac{2}{8}$ $\frac{4}{8}$ $\frac{16}{8}$ $\frac{10}{8}$ $\frac{20}{8}$ $\frac{18}{8}$ $\frac{22}{8}$

3. Reduce the following fractions to eighths :

$\frac{1}{2}$ $\frac{1}{4}$ $\frac{3}{4}$ $\frac{4}{4}$ $\frac{6}{4}$ $\frac{7}{2}$ $\frac{2}{16}$ $\frac{4}{16}$

4. Reduce the following fractions to twelfths :

$\frac{1}{2}$ $\frac{1}{4}$ $\frac{3}{4}$ $\frac{1}{3}$ $\frac{2}{3}$ $\frac{1}{6}$ $\frac{5}{6}$ $\frac{2}{24}$

5. Reduce the following fractions to lowest terms :

$\frac{2}{4}$ $\frac{4}{8}$ $\frac{10}{8}$ $\frac{8}{10}$ $\frac{3}{6}$ $\frac{4}{6}$ $\frac{6}{8}$ $\frac{5}{10}$

6. Express $\frac{1}{3}$ in. and $\frac{1}{2}$ in. as sixths of an inch, and tell which is the greater.

7. Express $\frac{1}{3}$ in. and $\frac{1}{4}$ in. as twelfths of an inch, and tell which is the greater.

8. Express as sixths : $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{2}{3}$.

9. Express as tenths : $\frac{1}{2}$, $\frac{1}{5}$, $\frac{3}{5}$, $\frac{2}{5}$, and $\frac{4}{5}$.

10. Express as fifteenths : $\frac{1}{3}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$, $\frac{2}{3}$, and $\frac{3}{5}$.

11. Express as sixteenths : $\frac{1}{2}$, $\frac{1}{4}$, $\frac{7}{8}$, $\frac{3}{4}$, $\frac{3}{8}$, and $\frac{5}{8}$.

12. Express $\frac{4}{8}$ as halves ; as fourths ; as sixteenths.

13. Reduce $\frac{8}{8}$ to halves ; to fourths ; to sixteenths.

14. How many fourths in $\frac{2}{4}$? in $\frac{1}{2}$? in $\frac{2}{2}$?

15. How many eighths in $\frac{4}{8}$? in $\frac{1}{2}$? in 1 ?

16. How many tenths in $\frac{5}{10}$? in $\frac{1}{2}$? in 1 ?

Addition. If we ask for the sum of 3 boys and 2 girls, the answer cannot be boys alone, or girls alone. But we say,

$$3 \text{ boys} = 3 \text{ children}$$
$$\underline{2 \text{ girls} = 2 \text{ children}}$$
$$5 \text{ children in all}$$

In adding, we think of things as having the same name.

In the same way, if we wish to find the sum of $\frac{3}{4}$ and $\frac{1}{2}$, we must think of these as $\frac{3}{4}$ and $\frac{2}{4}$, the sum being $\frac{5}{4}$, or $1\frac{1}{4}$.

In adding fractions we think of them as having the same name.

ORAL EXERCISE

1. Express $\frac{1}{4}$ as eighths. To the result add $\frac{5}{8}$.

2. If you are making the supports for a bookshelf and fasten a strip of molding $\frac{1}{4}$ in. thick to a strip of wood $\frac{5}{8}$ in. thick, how thick are the two together?

3. Express $\frac{4}{5}$ as tenths. To the result add $\frac{3}{10}$.

4. If you lay an arithmetic that is $\frac{4}{5}$ in. thick on a notebook that is $\frac{3}{10}$ in. thick, how thick are the two together?

5. Express $\frac{2}{3}$ as sixths. To the result add $\frac{1}{6}$.

6. If you sew a piece of cloth $\frac{2}{3}$ yd. wide to a strip $\frac{1}{6}$ yd. wide, how wide will the new piece be?

WRITTEN EXERCISE

Reduce to the same denominator and add :

1. $\frac{1}{2}, \frac{1}{4}$.	**3.** $\frac{1}{4}, \frac{5}{8}$.	**5.** $\frac{1}{2}, \frac{7}{8}$.	**7.** $\frac{1}{4}, \frac{1}{8}$.
2. $\frac{1}{2}, \frac{5}{8}$.	**4.** $\frac{1}{2}, \frac{3}{4}$.	**6.** $\frac{1}{4}, \frac{7}{8}$.	**8.** $\frac{3}{4}, \frac{5}{8}$.

Addition of Fractions. Margaret had a lily given to her when it was only $3\frac{3}{4}$ in. tall. After it had grown to be $7\frac{5}{6}$ in. taller, how tall was the lily?

We see that we must add $3\frac{3}{4}$ in. and $7\frac{5}{6}$ in.

We found on page 254 that we must think of the fractions as having the same denominator.

Teachers may, if they choose, speak of reducing the fractions to the least common denominator, or to fractions having the least common denominator. It is well, however, to use simple language at this time.

In adding $3\frac{3}{4}$ and $7\frac{5}{6}$, we might think of both fractions as 12ths or as 24ths. But to save work it is better to use fractions having as small a denominator as possible.

If we think of the numbers which can be exactly divided by both 4 and 6, we see that the smallest is 12. We know this be-

$$
\begin{array}{l}
3\frac{3}{4} = \quad 3\frac{9}{12} \\
7\frac{5}{6} = \quad \underline{7\frac{10}{12}} \\
\quad\quad\quad 10\frac{19}{12} = 11\frac{7}{12}
\end{array}
$$

cause no number less than 12 is exactly divisible by 4 and 6.

Therefore the smallest denominator that both fractions can have is 12.

We also see that $\frac{3}{4} = \frac{9}{12}$ and that $\frac{5}{6} = \frac{10}{12}$, because we may multiply both terms of $\frac{3}{4}$ by 3, and both terms of $\frac{5}{6}$ by 2.

Then the sum is $10\frac{19}{12}$, which equals $10 + 1\frac{7}{12}$, or $11\frac{7}{12}$. So the lily grew to be $11\frac{7}{12}$ in. tall.

The pupil is not expected to explain an example like this at present. Gradually, as here and on page 211, he should be led to add fractions in cases where the least common denominator can be seen by inspection. Unusual denominators, such as 7, 11, and 13, should not be used at this time. Even the illustrative problem given above, desirable as it is for purposes of illustration, is more difficult than is usually needed in business.

WRITTEN EXERCISE

1. Add $2\frac{1}{2}$ lb., $6\frac{1}{4}$ lb., and $1\frac{1}{4}$ lb.

2. Add $1\frac{1}{2}$ yd., $1\frac{1}{4}$ yd., and $2\frac{1}{4}$ yd.

3. The top of a teacher's desk is $4\frac{1}{3}$ ft. long and 3 ft. wide. What is the perimeter, that is, the distance around the top of the desk?

4. Some boys built a hut $7\frac{1}{4}$ ft. long and 5 ft. wide. What was the perimeter?

5. If a boy in this class weighs $66\frac{3}{4}$ lb., and his dog $20\frac{1}{2}$ lb., how much do they weigh together?

6. A lady bought three pieces of cloth, containing $17\frac{3}{8}$ yd., $16\frac{3}{4}$ yd., and $23\frac{1}{2}$ yd., respectively. How many yards did she buy?

7. One pole is $10\frac{1}{2}$ ft. long, another $10\frac{7}{8}$ ft., a third $10\frac{5}{16}$ ft., and a fourth 3 ft. What is their total length when placed end to end?

8. A man has $168\frac{3}{4}$ acres of land. He buys $3\frac{1}{2}$ acres from one neighbor and $49\frac{3}{4}$ acres from another. How many acres does he then own?

9. A kite string was broken, and four parts were saved. The first was $75\frac{1}{4}$ ft. long, the second $127\frac{5}{8}$ ft., the third 261 ft., and the fourth $89\frac{1}{2}$ ft. Allowing 1 ft. for tying, how long was the string when all four were tied together?

10. Five cans of sirup were measured carefully and the first was found to contain $2\frac{1}{4}$ qt., the second $2\frac{3}{8}$ qt., the third $2\frac{7}{16}$ qt., the fourth $2\frac{5}{8}$ qt., and the fifth $2\frac{1}{4}$ qt. How many quarts were there in all?

Subtraction of Fractions. Mollie had a little rosebush given to her. It was then only $3\frac{3}{4}$ in. tall. After it had grown to be $18\frac{5}{6}$ in. tall her mother asked her how much it had grown. What should Mollie answer?

We see that Mollie must subtract $3\frac{3}{4}$ in. from $18\frac{5}{6}$ in.

$$
\begin{array}{r}
18\frac{5}{6} = 18\frac{10}{12} \\
3\frac{3}{4} = 3\frac{9}{12} \\
\hline
15\frac{1}{12}
\end{array}
$$

In subtraction, as in addition, we must think of the fractions as having the same denominator.

The smallest denominator that we can use is 12.

We see that $\frac{5}{6} = \frac{10}{12}$, and that $\frac{3}{4} = \frac{9}{12}$.

Then $18\frac{5}{6} - 3\frac{3}{4} = 18\frac{10}{12} - 3\frac{9}{12} = 15\frac{1}{12}$.

So Mollie should say that her bush had grown $15\frac{1}{12}$ in.

1. If from a board $1\frac{5}{16}$ in. thick we plane off $\frac{3}{16}$ in., how thick is the board then?

2. If a notebook is $\frac{7}{12}$ in. thick and the cover is $\frac{1}{12}$ in. thick, how thick is the book without the cover?

3. If from a board $\frac{7}{8}$ in. thick we plane off $\frac{1}{4}$ in., how thick is the board then?

Subtract the following :

4. $\frac{1}{2} - \frac{1}{3}$.	**9.** $\frac{1}{2} - \frac{1}{5}$.	**14.** $3\frac{3}{4}$ in. $- 1\frac{1}{3}$ in.
5. $\frac{3}{4} - \frac{1}{2}$.	**10.** $\frac{3}{4} - \frac{1}{8}$.	**15.** $4\frac{3}{4}$ in. $- 2\frac{2}{3}$ in.
6. $\frac{7}{8} - \frac{1}{2}$.	**11.** $\frac{7}{8} - \frac{1}{4}$.	**16.** $5\frac{7}{8}$ yd. $- 2\frac{1}{4}$ yd.
7. $\frac{1}{2} - \frac{1}{4}$.	**12.** $\frac{1}{3} - \frac{1}{4}$.	**17.** $7\frac{7}{8}$ yd. $- 3\frac{3}{4}$ yd.
8. $\frac{2}{3} - \frac{1}{2}$.	**13.** $\frac{2}{3} - \frac{1}{4}$.	**18.** $8\frac{3}{5}$ in. $- 4\frac{1}{2}$ in.

IX. ALIQUOT PARTS

WRITTEN EXERCISE

1. Multiply 246 by 5. Divide 2460 by 2. Compare the results.

2. Instead of multiplying by 5, you may annex how many zeros and divide by what number?

3. Multiply 224 by 25. Divide 22,400 by 4. Compare the results.

4. Instead of multiplying by 25, you may annex how many zeros and divide by what number?

————————

To multiply by 5, annex a zero and divide by 2.
To multiply by 25, annex two zeros and divide by 4.

————————

5. Divide 240 by 5. Multiply 24 by 2. Compare the results.

6. Instead of dividing tens by 5, you may cut off how many zeros and multiply by what number?

7. Divide 300 by 25. Multiply 3 by 4. Compare the results.

8. Instead of dividing hundreds by 25, you may cut off how many zeros and multiply by what number?

————————

To divide tens by 5, cut off a zero and multiply by 2.
To divide hundreds by 25, cut off two zeros and multiply by 4.

Multiply the following :

1. 86 by 5.   **3.** 84 by 25.   **5.** 88 by 25.

2. 44 by 25.   **4.** 48 by 25.   **6.** 124 by 5.

Divide the following :

7. 110 ÷ 5.   **8.** 320 ÷ 5.   **9.** 800 ÷ 25.

Aliquot Part. An integer or a mixed number that will exactly divide a number is called an *aliquot part* of that number. Thus,

\$0.50 is $\frac{1}{2}$ of \$1	\$0.33$\frac{1}{3}$ is $\frac{1}{3}$ of \$1
\$0.25 is $\frac{1}{4}$ of \$1	\$0.66$\frac{2}{3}$ is $\frac{2}{3}$ of \$1
\$0.12$\frac{1}{2}$ is $\frac{1}{8}$ of \$1	\$0.20 is $\frac{1}{5}$ of \$1

Hence, instead of multiplying \$0.12$\frac{1}{2}$ by 16, we may simply multiply \$$\frac{1}{8}$ by 16, which is much easier.

Teachers should show the pupils that $16 \times$ \$$\frac{1}{8}$ gives the same answer as $\frac{1}{8}$ of \$16, and is an easier operation. They should also recognize that it is not necessary to label the numbers except when it adds to the clearness of a solution. That is, we may write "$16 \times \frac{1}{8} = 2$," the number of dollars.

Multiply the following :

1. $32 \times$ \$0.12$\frac{1}{2}$.   **6.** $120 \times$ \$0.66$\frac{2}{3}$.

2. $64 \times$ \$0.12$\frac{1}{2}$.   **7.** $375 \times$ \$0.33$\frac{1}{3}$.

3. $56 \times$ \$0.50.   **8.** $336 \times$ \$0.25.

4. $72 \times$ \$0.25.   **9.** $336 \times$ \$0.33$\frac{1}{3}$.

5. $96 \times$ \$0.33$\frac{1}{3}$.   **10.** $666 \times$ \$0.33$\frac{1}{3}$.

X. BILLS AND RECEIPTS

ORAL EXERCISE

1. What is meant by charging goods at a store?

2. What is meant by having an account at a store?

3. What is meant by a bill of goods bought at a store?

4. What does this item mean: "8 doz. eggs @ 30¢"?

Making out Bills. To *foot a bill* means to add the amounts and find the total cost. To *receipt a bill* means to stamp or write the words "Paid" or "Received Payment," followed by the date and by the name of the one to whom it is due. This is a receipted bill:

Newark, N.J., March 1, 1919

Mr. David Brownson

Bought of CHARLES DUNHAM

Feb.	*5*	*6 cans soup*		@ *20¢*	*1*	*20*

Received Payment, March 3, 1916

Chas. Dunham

---

5. Study the bill and answer these questions: What does @ mean? What is the amount of the bill? When were the goods bought? When was the bill paid? Who was the buyer? Who was the seller?

6. What does the receipt show?

The teacher should encourage the pupils to make out bills of goods at prices current in the place where they live. The meaning of the term "debtor" and the abbreviation "Dr." should be explained.

WRITTEN EXERCISE

Copy, fill, foot, and receipt each of the following bills, dating it and the receipt at the place where you live, and signing your name as the clerk who received the money :

1.

Mr. Robert Lee

Bought of GEORGE HALL

Jan.	2	*9 doz. eggs*	@ *32¢*	
		9 lb. butter	@ *33¢*	
	5	*6 lb. cheese*	@ *22¢*	

Received Payment

Geo. Hall

By John Jewett

2.

Mr. James Keene

Bought of B. S. OSBORNE & CO

Oct.	3	*12 yd. silk*	@ *$1.00*	
		9 yd. lace	@ *75¢*	
		8 yd. ribbon	@ *30¢*	

3.

Mr. R. S. Bell

Bought of McCLINTOCK & CO.

Apr.	6	*3 yd. silk*	@ *80¢*	
		2 doz. buttons	@ *45¢*	
	15	*12 yd. calico*	@ *7¢*	
		5 yd. lace	@ *40¢*	
May	10	*9 yd. linen*	@ *60¢*	
		2 yd. ribbon	@ *75¢*	

Copy, fill, foot, and receipt the following, as on page 261:

4.

[*Name of place, and date*]...19.........

M.........[*Name*]..

Bought of.................[*Name*].................., Dealer in Meats and Poultry

.....[*Date*]....	6 lb. roast beef	@ 34¢	$	
"	6 lb. chicken	@ 25¢		
	[*Receipt*]...		$	

5.

[*Name of place, and date*]...19.........

M.........[*Name*]..

Bought of.................[*Insert name of some grocer*]................., Grocer

.....[*Date*]....	4 lb. powdered sugar	@ 7¢	$	
"	3 doz. eggs	@ 35¢		
"	½ doz. oranges	@ 60¢		
	[*Receipt*]...		$	

6.

[*Name of place, and date*]...19.........

M.........[*Name*]..

Bought of....................[*Name*]....................., Grocer

.....[*Date*]....	2 heads lettuce	@ 5¢	$	
"	6 lb. butter	@ 32¢		
"	4 gal. oil	@ 18¢		
"	8 lb. raisins	@ 12¢		
"	3 lb. coffee	@ 30¢		
	[*Receipt*]...		$	

Make out bills for the following:

1. 15 lb. granulated sugar @ 5¢, 3 pk. fancy potatoes @ 25¢, 4 cans salmon @ 8¢.

2. 7 lb. butterine @ 25¢, 4 jars New Orleans molasses @ 20¢, 2 packages raisins @ 9¢, 5 boxes matches @ 4¢.

3. 84 gro. bone buttons @ 18¢, 694 yd. cambric @ 17¢, 72 doz. pearl buttons @ 9¢, 364 yd. cashmere @ 82¢.

12 dozen = 1 gross (gro.). Therefore 144 = 1 gro.

4. 8 doz. combs @ $1.95, 4 doz. brushes @ $18.37, 3 doz. atomizers @ $19.25, 4 gro. toothbrushes @ $9.35, ½ gro. nailbrushes @ $27.50.

5. 480 yd. matting @ 18¢, 375 yd. matting @ 19¢, 284 yd. carpet @ 48¢, 8 rugs @ $7.33, 4 doz. doormats @ $6.75.

6. 9 dining-room sets @ $62.50, 16 rockers @ $5.35, 8 sideboards @ $32.50, 6 card tables @ $8.75, 4 china closets @ $17.50.

7. 325 yd. carpet @ 48¢, 520 yd. matting @ 22¢, 16 rugs @ $6.40, 4 rugs @ $12.50, 3 doz. doormats @ $7.30, 328 yd. calico @ 6¢.

8. 8 doz. hatchets @ $10.75, 6 doz. pairs hinges @ $4.35, 5 doz. carpenter's squares @ $34.50, ½ gro. locks @ $42.50, 8 doz. files @ $6.25.

9. 75 M (75,000) envelopes @ $2.30, 75 lb. paper @ 22¢, 4 doz. fountain pens @ $23.50, 10 doz. bottles ink @ 42¢, 6 dictionaries @ $5.50.

XI. GENERAL REVIEW

WRITTEN EXERCISE

1. Frank's father had $1250 in a bank. He drew out $533 and afterwards $265. How many dollars did he still have in the bank?

2. Charles has 250 chickens. In one yard he has 46 chickens; in another, 35; and in another, 53. How many chickens has he that are not in these yards?

3. Mary bought 8 yd. of cloth at 5¢ a yard. How much change should she receive if she gave the storekeeper a half dollar?

4. If 62 acres of land cost $992, how much will 1 acre cost? How much will 40 acres cost?

5. One house is valued at $7270 and another house at three times as much. How much are both together worth?

6. If 6 overcoats cost $144, how many overcoats can be bought for $1320? (First find the cost of one overcoat.)

7. Mr. Jackson had $700. How much money will he have left after buying a horse for $150, a wagon for $45, and 4 cows at $35 each?

8. What is the cost of 15 yd. of velvet at $1.25 a yard and 5 yd. of ribbon at 37¢ a yard?

9. I have 63 bu. of corn in one bin, 54 bu. in another, 37 bu. in a third, and 29 bu. in a fourth. How many pecks of corn do I have?

Teachers will observe that the problems in this exercise are two-step problems. This type of problem has been approached gradually.

10. What is the cost of 16 barrels of flour at $6.25 a barrel and 7 barrels of apples at $2.50 a barrel?

11. From a bin containing 516 bu. of oats, 65 bu. were sown and 73 bu. have been fed to horses. How many bushels of oats are left?

12. What is the cost of fencing a park 36 rd. long and 14 rd. wide at $2.50 a rod?

13. If a man having $1000 buys 5 horses at $152 each and spends the rest of his money for cows at $40 apiece, how many cows does he buy?

Take $5 \times$ $152 from $1000, and then divide by $40.

14. At a rent of $23 a month for a house and $12 a month for a stable, what is the rent of both for 1 yr.?

15. What is the cost of 9 horses at $175.75 each and 76 tons of hay at $18.50 a ton?

16. Find the area of a field 40 rd. long and 24 rd. wide. Draw a plan of the field on the scale of $\frac{1}{4}$ in. to 4 yd.

17. A mile of gas pipe is laid at a cost of $5 a rod. What is the cost of laying the pipe?

18. At 40¢ a dozen, what will 30 lemons cost?

19. How many yards of braid will be required to bind a rug 5 ft. long and 3 ft. wide?

20. If a man travels 70 mi. a day, how many days will it take him to make a trip of 1470 mi.?

Find how many times 70 is contained in 1470.

21. At $40 an acre, what will 2 eighty-acre farms cost?

22. How many quarts in 248 pt.? How many gallons?

23. A milk dealer sells every day 16 cans of milk, each holding 2 gal. How many quarts does he sell?

24. A grocer bought 4 bu. of apples at 80¢ a bushel and sold them at 25¢ a peck. How much did he gain?

25. What is the price of a dozen oranges at the rate of 3 oranges for a dime?

26. A man earns 35¢ an hour and works 2 da. of 8 hr. each. How much does he receive?

27. At 20¢ a square yard, what will it cost to oil a floor 6 yd. long and 4 yd. wide?

28. Draw a plan of the floor in Ex. 27 on the scale of $\frac{1}{2}$ in. to 1 yd. Find the perimeter of the room.

29. A carload of coal containing 30,000 lb. was sold at $6 a ton. How much was received?

30. How many cubic feet of stone in a wall 20 ft. long, 4 ft. high, and 2 ft. thick?

31. Walter has 100 inch cubes. They are built into a solid 10 in. long and 2 in. wide. How high is the solid?

32. How many pint packages can a seedsman fill from 2 pk. 2 qt. of seeds?

33. If a man earns $2 a day, how many days will it take him to earn $24? to earn $36? to earn $96?

34. A boy bought 4 doz. pencils at 35¢ a dozen and sold them at 4¢ apiece. How much did he gain?

35. A peddler in a city buys a pushcart for $22. He has $14.75 of his own and borrows $3.50 from his brother. How much more does he borrow to buy the pushcart?

36. A peddler bought 6 doz. oranges at 15¢ a dozen and sold them at 2¢ apiece. How much did he make on all the oranges?

37. A man bought 4 bunches of bananas. The first bunch contained 120 bananas; the second, 176; the third, 160; and the fourth, 240. He sold the bananas at the rate of 4 for 5¢. How much did he receive for them?

38. A workman in a factory makes 9 doz. caps a day. How many caps can he make in the 6 working days of a week? How many can he make in 7 wk.?

39. If a workman uses 2 buttons on each cap that he makes, how many caps can be trimmed with 12 doz. buttons? How many can be trimmed with 24 doz. buttons?

40. A newsboy pays 3¢ for 5 newspapers. How much money must he have in order to buy 75 newspapers?

41. A grocer sells 8 eggs marked 36¢ a dozen. How much change should he give for 25¢?

42. A boy runs on errands for a grocer. He gets his car fare and also 5¢ for each errand. How much does he get if he runs on 9 errands and pays 20¢ for car fare?

43. A workman's wages are $2.50 a day, and he usually works 6 da. each week. This week he stays at home 2 da. How much will he find in his pay envelope at the end of the week?

44. Our class has 28 children. The teacher and the children go on a picnic and pay 10¢ each for car fare. They have $8.75 for the picnic. How much money is left for luncheon after paying all the car fares?

EP

PROBLEMS WITHOUT NUMBERS

1. If you know the cost of each of two different things, how do you find the cost of both together?

2. If you know the number of feet in a piece of string, and cut off a part of the string, how do you find the length of what is left?

3. If you know the cost of one yard of cloth, how do you find the cost of a given number of yards?

4. If you have a certain number of inches of cloth of a certain width, and a book cover requires a certain number of inches of this width, how do you find the number of books you can cover with all the cloth?

5. If you know the number of quarts of milk in a can, how do you find the number of pints?

6. If you know the length of a piece of picture molding in feet, how do you find the length in inches?

7. How do you multiply a number of two figures by a number of one figure?

8. What do you mean by drawing a line to a given scale, say, to the scale of 1 in. to a foot?

9. How do you draw a rectangle to a given scale?

10. How do you find the area of a rectangle? Draw a rectangle to explain your answer.

11. Draw this page of the book to some scale, and write below the plan the scale that you have used.

12. Draw a plan of the top of your desk to some scale, and write below the plan the scale that you have used.

XII. USING WHAT YOU HAVE LEARNED

THE SURPRISE PARTY

1. Fanny will be 9 years old next week, and the class is going to give her a surprise party. There are 17 boys and 19 girls besides Fanny. The boys agree to put in 15¢ apiece and the girls 10¢ apiece. How much will the boys put in? How much will the girls put in?

2. How much money will the boys and girls put in for Fanny's surprise party in Ex. 1?

3. They take out 75¢ for flowers. How much does that leave?

4. With what is left, after taking out the money for the flowers, they think of buying a present for Fanny. They spend some of it, however, for candles for the cake, and have $3.50 left. How much did they spend for candles?

5. They priced a watch and found that this would use half of the $3.50. What was the price of the watch? If they buy it, how much money will they have left?

6. They bought the watch and then bought a silver bracelet for $1.50, and decided to give the rest to a poor woman whom Fanny liked. How much money did they give to the woman?

7. At the night of the party each of the 19 girls took 4 little cakes to the party. How many did they all take?

8. Since the boys wanted to do their share, each one took 6 apples. How many apples did the 17 boys take?

CAMP FIRE GIRLS

1. Camp Fire Girls are over 12 yr. old. In how many years and months, to the nearest month, will each girl in your class be old enough to be a member?

2. A group of girls, not less than six nor more than twenty in number, can form a Camp Fire. In a certain town there are 7 Camp Fires, averaging 14 girls each. How many Camp Fire Girls are there in the town?

3. A Camp Fire of 14 girls found that they could buy their gowns for $2.50 each, or could buy the materials for $1.70 each. How much would they save in all by buying the materials and making their gowns?

4. There are three ranks of Camp Fire Girls, the Wood Gatherer, the Fire Maker, and the Torch Bearer. In our camp there are 7 Wood Gatherers, each paying $1.70 for the materials for a gown. How much do the seven pay?

5. There were 4 Fire Makers in the camp. Each paid $1.50 for a Fire Maker's bracelet, $1.70 for materials for a gown, and $1.25 for a pair of moccasins. How much did each Fire Maker pay in all? How much did all four pay?

6. There were 3 Torch Bearers in the camp. Each paid $1.50 for a Torch Bearer's pin, 25¢ for a Camp Fire hat-pin, 65¢ for materials for bloomers, 30¢ for a dozen Camp Fire buttons, and 25¢ for a Torch Bearer's emblem. How much did each pay in all? How much did all three pay?

7. The Camp Fire Girls have many honors. For Home Craft Honors a girl must do things about the house. Among other things she must plan refreshments for a party of 10 girls, not spending more than $1. Make such a plan and bring the list, with prices, to school to-morrow.

8. For Hand Craft Honors a girl must do things with her hands, such as make a skirt. Find out how much the materials for a school skirt would cost, and bring the list, with prices, to school to-morrow.

9. The Camp Fire Girls often go out to camp. Eight of them, besides the Guardian of the Fire (making nine in all), went camping. They spent 40¢ each for trolley fares, $1.60 each for railway tickets, $5.40 for the rent and carriage of the tents for the party, and $24.44 for food and camp expenses for the party. How much did they spend in all? How much should each contribute if the Guardian of the Fire had her expenses paid by the rest of the girls?

To many girls this subject of the Camp Fire Girls is of great interest. For such pupils these two pages are especially intended. Through the kindness of the national organization the illustration on page 270 is printed.

XIII. LITTLE EXAMINATIONS

I.   1. $4856 + 9237$.
     2. $7902 - 5919$.
     3. $\$40.73 + \$20.96$.
     4. $\$50.13 - \$32.75$.
     5. $7 \times \$2.96$.

     6. $300 \times \$1.75$.
     7. $72 \times \$3.75$.
     8. 475×582.
     9. $25,984 \div 58$.
   10. 2 cu. ft. = (?) cu. in.

II.   1. $8346 + 9078$.
     2. $3709 - 2963$.
     3. $\$30.82 + \$52.86$.
     4. $\$52.32 - \$29.56$.
     5. $8 \times \$2.85$.

     6. $400 \times \$2.40$.
     7. $38 \times \$4.22$.
     8. 287×496.
     9. $7500 \div 125$.
   10. 4 cu. ft. = (?) cu. in.

III.   1. $4283 + 6296$.
     2. $4132 - 2876$.
     3. $\$40.27 + \$32.96$.
     4. $\$60.01 - \$19.83$.
     5. $9 \times \$3.27$.
     6. $520 \times \$3.04$.

     7. $68 \times \$5.37$.
     8. 394×498.
     9. $14,500 \div 125$.
   10. 288 sq. in. = (?) sq. ft.
   11. 17 bu. = (?) pk.
   12. $\frac{3}{8}$ of 64.

IV.   1. $7129 + 3786$.
     2. $5235 - 2868$.
     3. $\$23.49 + \$87.62$.
     4. $\$52.29 - \$26.60$.
     5. $6 \times \$4.72$.
     6. $760 \times \$4.60$.

     7. $49 \times \$7.72$.
     8. 778×642.
     9. $38,802 \div 116$.
   10. 9 sq. ft. = (?) sq. in.
   11. 40 pt. = (?) qt.
   12. $\frac{3}{4}$ of 96.

XIV. WHAT THE PUPIL·SHOULD KNOW WHEN HE HAS FINISHED THIS BOOK

YOU SHOULD ADD QUICKLY AND ACCURATELY

Copy and add, timing yourself on each set of ten examples.

1. $4136 + 9287.$	**21.** $\$52.43 + \$48.76.$
2. $3092 + 4768.$	**22.** $\$524.30 + \$48.76.$
3. $4381 + 8092.$	**23.** $5243 + 4876.$
4. $5276 + 8397.$	**24.** $8179 + 9283.$
5. $4855 + 8762.$	**25.** $\$81.79 + \$92.83.$
6. $3984 + 9876.$	**26.** $\$817.90 + \$928.30.$
7. $8237 + 4583.$	**27.** $\$54.62 + \$87.96.$
8. $5692 + 8173.$	**28.** $\$78.37 + \$49.87.$
9. $8494 + 9877.$	**29.** $\$70.36 + \$89.09.$
10. $4086 + 3790.$	**30.** $\$37.49 + \$98.97.$
11. $6842 + 9382.$	**31.** $428 + 396 + 987.$
12. $7209 + 9089.$	**32.** $629 + 438 + 909.$
13. $8778 + 8296.$	**33.** $778 + 896 + 408.$
14. $4009 + 8999.$	**34.** $539 + 683 + 997.$
15. $6872 + 1983.$	**35.** $\$5.28 + \$4.96 + \$3.74.$
16. $4849 + 2183.$	**36.** $\$52.80 + \$4.96 + \$37.40.$
17. $7680 + 9398.$	**37.** $\$52.80 + \$4.96 + \$3.74.$
18. $4777 + 8643.$	**38.** $\$128.90 + \$34.76 + \$48.23.$
19. $5273 + 8556.$	**39.** $\$12.89 + \$34.76 + \$48.23.$
20. $4196 + 3784.$	**40.** $\$12.89 + \$347.60 + \$428.30.$

Efficiency tests of this kind are helpful throughout the course, and many of them are provided in this book.

YOU SHOULD SUBTRACT QUICKLY AND ACCURATELY

Copy and subtract, timing yourself on each set of ten examples:

1. 7830 — 4296.
2. 8132 — 3894.
3. 6209 — 4836.
4. 7108 — 2987.
5. 5633 — 1987.
6. 4206 — 1899.
7. 3837 — 1968.
8. 9001 — 2983.
9. 8002 — 3093.
10. 6277 — 4968.
11. 5307 — 2836.
12. 6612 — 4833.
13. 4702 — 3685.
14. 5211 — 2033.
15. 4787 — 2939.
16. 2192 — 1998.
17. 6070 — 3841.
18. 5791 — 2992.
19. 6280 — 5691.
20. 2936 — 1987.

21. $29.60 — $3.48.
22. $128.30 — $26.37.
23. $201.40 — $52.33.
24. $280.30 — $29.46.
25. $310.02 — $38.36.
26. $401.01 — $56.75.
27. $126.37 — $109.48.
28. $630.02 — $427.63.
29. $702.23 — $426.48.
30. $523.41 — $239.68.
31. $429.83 — $327.60.
32. $527.75 — $209.09.
33. $607.07 — $421.36.
34. $528.28 — $492.99.
35. $800.70 — $528.36.
36. $602.73 — $478.64.
37. $281.32 — $193.82.
38. $1026.00 — $873.75.
39. $2000.00 — $1482.60.
40. $2172.30 — $1986.45.

In computing the time, the pupil should include the time of copying. In practical business we have to write the numbers as well as subtract them, and this is part of the training. The pupil should learn to write the numbers neatly and accurately as well as quickly.

YOU SHOULD MULTIPLY QUICKLY AND ACCURATELY

Copy and multiply, timing yourself on each set of ten examples :

1. 29×38.	21. 121×342.	41. $2 \times \$48.72$.
2. 42×70.	22. 426×809.	42. $3 \times \$96.80$.
3. 63×96.	23. 707×556.	43. $5 \times \$40.75$.
4. 45×84.	24. 432×487.	44. $7 \times \$36.42$.
5. 32×29.	25. 562×809.	45. $4 \times \$80.92$.
6. 86×98.	26. 977×844.	46. $9 \times \$78.82$.
7. 70×93.	27. 555×876.	47. $6 \times \$68.08$.
8. 80×90.	28. 743×201.	48. $7 \times \$98.74$.
9. 68×86.	29. 529×826.	49. $9 \times \$56.43$.
10. 44×88.	30. 432×481.	50. $8 \times \$80.96$.
11. 14×236.	31. 26×3478.	51. $15 \times \$2.78$.
12. 43×309.	32. 43×8296.	52. $28 \times \$3.46$.
13. 57×877.	33. 21×8477.	53. $56 \times \$4.09$.
14. 92×379.	34. 30×9872.	54. $42 \times \$9.81$.
15. 64×909.	35. 62×8907.	55. $77 \times \$8.75$.
16. 83×888.	36. 48×7460.	56. $48 \times \$21.36$.
17. 47×926.	37. 38×9080.	57. $37 \times \$92.08$.
18. 35×875.	38. 65×2178.	58. $56 \times \$90.09$.
19. 44×557.	39. 36×8472.	59. $78 \times \$89.86$.
20. 63×892.	40. 27×9628.	60. $96 \times \$86.79$.

In giving such efficiency tests the teacher may find it of advantage to give on one day Exs. 1-10 on page 273, Exs. 1-10 on page 274, Exs. 1-10 on page 275, and so on; and on another day Exs. 11-20 on the same pages.

YOU SHOULD DIVIDE QUICKLY AND ACCURATELY

Copy and divide, writing both quotient and remainder, timing yourself on each set of ten examples :

1. $428 \div 26$.	21. $2173 \div 42$.	41. $\$144 \div 12$.
2. $378 \div 24$.	22. $5683 \div 85$.	42. $\$288 \div 24$.
3. $526 \div 28$.	23. $8093 \div 92$.	43. $\$17.28 \div 4$.
4. $875 \div 43$.	24. $9062 \div 77$.	44. $\$1728 \div 12$.
5. $920 \div 37$.	25. $8112 \div 92$.	45. $\$1728 \div 24$.
6. $801 \div 49$.	26. $3984 \div 46$.	46. $\$1331 \div 11$.
7. $676 \div 33$.	27. $5085 \div 70$.	47. $\$7007 \div 11$.
8. $494 \div 19$.	28. $3700 \div 69$.	48. $\$2626 \div 13$.
9. $962 \div 32$.	29. $4008 \div 90$.	49. $\$2756 \div 13$.
10. $488 \div 27$.	30. $7782 \div 56$.	50. $\$4575 \div 25$.
11. $1283 \div 38$.	31. $5434 \div 82$.	51. $\$1270 \div 12$.
12. $4072 \div 56$.	32. $4848 \div 49$.	52. $\$3250 \div 14$.
13. $5710 \div 29$.	33. $6209 \div 80$.	53. $\$1236 \div 21$.
14. $8209 \div 37$.	34. $5000 \div 91$.	54. $\$2238 \div 33$.
15. $9108 \div 43$.	35. $3707 \div 86$.	55. $\$4756 \div 42$.
16. $9807 \div 46$.	36. $5200 \div 35$.	56. $\$4020 \div 45$.
17. $5055 \div 75$.	37. $4801 \div 29$.	57. $\$5005 \div 72$.
18. $8026 \div 93$.	38. $8237 \div 92$.	58. $\$6172 \div 36$.
19. $9071 \div 85$.	39. $5781 \div 86$.	59. $\$4856 \div 29$.
20. $9002 \div 96$.	40. $4000 \div 99$.	60. $\$3792 \div 18$.

In practical work in division there is usually a remainder. When the pupil studies a more advanced book he can carry the quotient as far as may be necessary by means of decimal fractions. At present he should merely indicate the remainder or write a common fraction in the quotient.

**YOU SHOULD BE ABLE TO REDUCE, ADD, AND SUBTRACT
THE ORDINARY COMMON FRACTIONS OF BUSINESS, AND
FIND A FRACTIONAL PART OF A WHOLE NUMBER**

*Copy, and perform the operations indicated, timing your-
self on each set of ten examples :*

1. $\frac{2}{3} = \frac{}{6}$.
2. $\frac{3}{4} = \frac{}{8}$.
3. $\frac{1}{2} = \frac{}{4}$.
4. $\frac{1}{8} = \frac{}{16}$.
5. $\frac{3}{8} = \frac{}{16}$.
6. $\frac{1}{4} = \frac{}{8}$.
7. $\frac{1}{2} = \frac{}{8}$.
8. $\frac{1}{3} = \frac{}{9}$.
9. $\frac{5}{8} = \frac{}{16}$.
10. $\frac{7}{8} = \frac{}{32}$.
11. $\frac{1}{2} + \frac{3}{8}$.
12. $\frac{3}{4} + \frac{1}{8}$.
13. $\frac{3}{4} + \frac{7}{8}$.
14. $\frac{5}{8} + \frac{1}{2}$.
15. $\frac{7}{8} + \frac{1}{2}$.
16. $\frac{1}{3} + \frac{1}{2}$.
17. $\frac{2}{3} + \frac{1}{2}$.
18. $\frac{2}{3} + \frac{3}{4}$.
19. $\frac{2}{3} + \frac{7}{8}$.
20. $\frac{2}{5} + \frac{1}{3}$.

21. $\frac{1}{2} - \frac{1}{4}$.
22. $\frac{3}{4} - \frac{1}{2}$.
23. $\frac{1}{2} - \frac{1}{8}$.
24. $\frac{1}{2} - \frac{3}{8}$.
25. $\frac{5}{8} - \frac{1}{2}$.
26. $\frac{7}{8} - \frac{3}{4}$.
27. $\frac{3}{5} - \frac{1}{2}$.
28. $\frac{3}{5} - \frac{1}{3}$.
29. $\frac{2}{3} - \frac{1}{2}$.
30. $\frac{3}{4} - \frac{2}{3}$.
31. $\frac{1}{2} + \frac{1}{4} + \frac{1}{8}$.
32. $\frac{1}{2} + \frac{3}{4} + \frac{1}{8}$.
33. $\frac{1}{2} + \frac{3}{4} + \frac{5}{8}$.
34. $\frac{1}{2} + \frac{3}{4} + \frac{7}{8}$.
35. $\frac{1}{3} + \frac{1}{4} + \frac{1}{8}$.
36. $\frac{2}{3} + \frac{1}{4} + \frac{3}{8}$.
37. $\frac{2}{3} + \frac{3}{4} + \frac{7}{8}$.
38. $\frac{1}{5} + \frac{1}{2} + \frac{1}{3}$.
39. $\frac{2}{5} + \frac{1}{2} + \frac{1}{3}$.
40. $\frac{4}{5} + \frac{1}{2} + \frac{2}{3}$.

41. $\frac{1}{2}$ of 428.
42. $\frac{1}{3}$ of 828.
43. $\frac{2}{3}$ of 624.
44. $\frac{1}{4}$ of 624.
45. $\frac{3}{4}$ of 736.
46. $\frac{1}{8}$ of 968.
47. $\frac{3}{8}$ of 256.
48. $\frac{5}{8}$ of 496.
49. $\frac{7}{8}$ of 584.
50. $\frac{3}{5}$ of 475.
51. $2\frac{1}{2} + 3\frac{3}{4}$.
52. $3\frac{3}{4} - 2\frac{1}{2}$.
53. $4\frac{3}{8} + 3\frac{1}{2}$.
54. $4\frac{3}{8} - 3\frac{1}{2}$.
55. $6\frac{2}{3} + 2\frac{1}{2}$.
56. $6\frac{2}{3} - 2\frac{1}{2}$.
57. $4\frac{3}{8} + 1\frac{1}{3}$.
58. $4\frac{3}{8} - 1\frac{1}{3}$.
59. $7\frac{2}{3} + 2\frac{1}{5}$.
60. $7\frac{2}{3} - 2\frac{1}{5}$.

THE COMMON TABLES OF MEASURES, AND HOW TO USE THEM

Copy, and complete each statement, timing yourself on each set of ten examples :

1. 1 ft. = (?) in.
2. 7 ft. = (?) in.
3. 9 ft. = (?) in.
4. 1 yd. = (?) ft.
5. 7 yd. = (?) ft.
6. $3\frac{1}{2}$ yd. = (?) ft.
7. 1 yd. = (?) in.
8. $2\frac{1}{2}$ yd. = (?) in.
9. 1 rd. = (?) ft.
10. 2 rd. = (?) ft.
11. 1 rd. = (?) yd.
12. 9 rd. = (?) yd.
13. 1 mi. = (?) rd.
14. 4 mi. = (?) rd.
15. 1 mi. = (?) yd.
16. $\frac{1}{2}$ mi. = (?) yd.
17. 1 mi. = (?) ft.
18. $3\frac{1}{4}$ mi. = (?) ft.
19. $\frac{2}{3}$ mi. = (?) ft.
20. $\frac{3}{4}$ mi. = (?) ft.

21. 1 lb. = (?) oz.
22. $\frac{3}{4}$ lb. = (?) oz.
23. $2\frac{1}{2}$ lb. = (?) oz.
24. 16 oz. = (?) lb.
25. 144 oz. = (?) lb.
26. 288 oz. = (?) lb.
27. 1 T. = (?) lb.
28. $3\frac{1}{2}$ T. = (?) lb.
29. 1 qt. = (?) pt.
30. $7\frac{1}{2}$ qt. = (?) pt.
31. 1 gal. = (?) qt.
32. $3\frac{3}{4}$ gal. = (?) qt.
33. $4\frac{3}{4}$ gal. = (?) pt.
34. 1 bu. = (?) pk.
35. $7\frac{1}{2}$ bu. = (?) pk.
36. 1 pk. = (?) qt.
37. $5\frac{1}{2}$ pk. = (?) qt.
38. 7 sq. ft. = (?) sq. in.
39. 7 sq. yd. = (?) sq. ft.
40. 7 hr. = (?) min.

Teachers should remember that we no longer use such numbers as 4 mi. 17 rd. 3 yd. 2 ft. 2 in.

LENGTH

12 inches (in.) = 1 foot (ft.)

3 feet = 1 yard (yd.)

$16\frac{1}{2}$ feet = 1 rod (rd.)

5280 feet, or 320 rods = 1 mile (mi.)

SQUARE MEASURE

144 square inches (sq. in.) = 1 square foot (sq. ft.)

9 square feet = 1 square yard (sq. yd.)

$30\frac{1}{4}$ square yards = 1 square rod (sq. rd.)

160 square rods = 1 acre (A.)

640 acres = 1 square mile (sq. mi.)

CUBIC MEASURE

1728 cubic inches (cu. in.) = 1 cubic foot (cu. ft.)

27 cubic feet = 1 cubic yard (cu. yd.)

128 cubic feet = 1 cord (cd.)

WEIGHT

16 ounces (oz.) = 1 pound (lb.)

2000 pounds = 1 ton (T.)

LIQUID MEASURE

4 gills (gi.) = 1 pint (pt.)

2 pints = 1 quart (qt.)

4 quarts = 1 gallon (gal.)

DRY MEASURE

2 pints (pt.) = 1 quart (qt.)

8 quarts = 1 peck (pk.)

4 pecks = 1 bushel (bu.)

Multiplication Table

$1 \times 2 = 2$	$1 \times 3 = 3$	$1 \times 4 = 4$	$1 \times 5 = 5$
$2 \times 2 = 4$	$2 \times 3 = 6$	$2 \times 4 = 8$	$2 \times 5 = 10$
$3 \times 2 = 6$	$3 \times 3 = 9$	$3 \times 4 = 12$	$3 \times 5 = 15$
$4 \times 2 = 8$	$4 \times 3 = 12$	$4 \times 4 = 16$	$4 \times 5 = 20$
$5 \times 2 = 10$	$5 \times 3 = 15$	$5 \times 4 = 20$	$5 \times 5 = 25$
$6 \times 2 = 12$	$6 \times 3 = 18$	$6 \times 4 = 24$	$6 \times 5 = 30$
$7 \times 2 = 14$	$7 \times 3 = 21$	$7 \times 4 = 28$	$7 \times 5 = 35$
$8 \times 2 = 16$	$8 \times 3 = 24$	$8 \times 4 = 32$	$8 \times 5 = 40$
$9 \times 2 = 18$	$9 \times 3 = 27$	$9 \times 4 = 36$	$9 \times 5 = 45$
$10 \times 2 = 20$	$10 \times 3 = 30$	$10 \times 4 = 40$	$10 \times 5 = 50$
$11 \times 2 = 22$	$11 \times 3 = 33$	$11 \times 4 = 44$	$11 \times 5 = 55$
$12 \times 2 = 24$	$12 \times 3 = 36$	$12 \times 4 = 48$	$12 \times 5 = 60$

$1 \times 6 = 6$	$1 \times 7 = 7$	$1 \times 8 = 8$	$1 \times 9 = 9$
$2 \times 6 = 12$	$2 \times 7 = 14$	$2 \times 8 = 16$	$2 \times 9 = 18$
$3 \times 6 = 18$	$3 \times 7 = 21$	$3 \times 8 = 24$	$3 \times 9 = 27$
$4 \times 6 = 24$	$4 \times 7 = 28$	$4 \times 8 = 32$	$4 \times 9 = 36$
$5 \times 6 = 30$	$5 \times 7 = 35$	$5 \times 8 = 40$	$5 \times 9 = 45$
$6 \times 6 = 36$	$6 \times 7 = 42$	$6 \times 8 = 48$	$6 \times 9 = 54$
$7 \times 6 = 42$	$7 \times 7 = 49$	$7 \times 8 = 56$	$7 \times 9 = 63$
$8 \times 6 = 48$	$8 \times 7 = 56$	$8 \times 8 = 64$	$8 \times 9 = 72$
$9 \times 6 = 54$	$9 \times 7 = 63$	$9 \times 8 = 72$	$9 \times 9 = 81$
$10 \times 6 = 60$	$10 \times 7 = 70$	$10 \times 8 = 80$	$10 \times 9 \doteq 90$
$11 \times 6 = 66$	$11 \times 7 = 77$	$11 \times 8 = 88$	$11 \times 9 = 99$
$12 \times 6 = 72$	$12 \times 7 = 84$	$12 \times 8 = 96$	$12 \times 9 = 108$

INDEX

281

ANSWERS

Page 54. **1.** 555; 249; 121; 609; 303; 880. **2.** Two hundred forty-two; two hundred seven; five hundred twenty; six hundred thirty-four; nine hundred eighty-seven; eight hundred forty-three; seven hundred sixty-five.

Page 55. **1.** 101; 150. **2.** 203; 270. **3.** 306; 390. **4.** 409; 540. **5.** 606; 708. **6.** Five hundred twenty-seven; six hundred forty-two; three hundred thirty-four; four hundred fifty-six; six hundred seventy-eight; nine hundred nine; seven hundred forty-two; eight hundred thirty; three hundred three. **7.** Seven hundred eight; eight hundred sixty; nine hundred one; seven hundred seventy-seven; eight hundred; seven hundred fifty; six hundred thirty; four hundred; one thousand. **8.** 43; 877. **9.** 21; 789. **10.** 52; 999. **11.** 78; 678. **12.** 500; 567. **13.** 600; 673. **14.** 700; 727.

Page 58. **1.** 70; 72; 77; 77; 77; 90. **2.** 93; 99; 93; 99; 99; 80. **3.** 94; 94; 95; 98; 99; 100. **4.** 360; 376; 379; 399; 599; 865. **5.** 674; 748; 789; 686; 859; 796.

Page 60. **1.** 60; 60; 61; 60; 64; 52; 90. **2.** 60; 81; 92; 90; 80; 62; 54. **3.** 80; 52; 72; 63; 83; 45; 91. **4.** 70; 73; 83; 46; 91; 51; 85. **5.** 75; 95; 68; 85; 74; 94; 92. **6.** 85; 92; 90; 71; 83; 64; 65. **7.** 77; 81; 68; 80; 58; 73; 76. **8.** 64; 81; 76; 82; 60; 81; 63. **9.** 40; 54; 60; 54; 74; 78; 83. **10.** 72; 105; 107; 99; 100; 101; 85.

Page 61. **1.** 293. **2.** 261. **3.** 463 ft. **4.** 382. **5.** 575. **6.** 574. **7.** 760. **8.** 712. **9.** $554.

Page 62. **1.** 314. **2.** 305 miles. **3.** 405. **4.** 625. **5.** 548. **6.** 766. **7.** 652. **8.** $737.

Page 63. **1.** 352. **2.** 656. **3.** 642. **4.** 417. **5.** 680. **6.** 833. **7.** 710. **8.** 820. **9.** 911. **10.** 630. **11.** 911. **12.** 798. **13.** 683.

Page 66. **1.** 25; 29; 44; 28; 28; 35; 58. **2.** 28; 18; 27; 19; 28; 43; 47. **3.** 28; 16; 34; 18; 16; 34; 57. **4.** 8; 27; 38; 29; 27; 43; 36. **5.** 15. **6.** 14 ft. **7.** 12. **8.** 29 yr. **9.** 14 in. **10.** 3. **11.** 17.

Page 67. 1. 482; 473; 464; 482; 412; 211. **2.** 292; 451; 282; 492; 363; 467. **3.** 272; 242; 252; 493; 185; 245.

Page 69. 1. 526; 237; 334; 258; 236; 179. **2.** 317; 469; 163; 179; 248; 235. **3.** 219; 259; 146; 237; 289; 364. **4.** 467; 225; 138; 355; 247; 508. **5.** 577; 339; 589; 567; 387; 145. **6.** 388; 587; 485; 434; 294; 346. **7.** 109; 99; 199; 309; 498; 488. **8.** 137. **9.** 256. **10.** 180 ft.

Page 70. 1. 44. **2.** 133. **3.** 257. **4.** 368. **5.** 489. **6.** 46. **7.** 157. **8.** 269. **9.** 338. **10.** 421. **11.** 252. **12.** 267. **13.** 378. **14.** 449. **15.** 558. **16.** 88. **17.** 165. **18.** 279. **19.** 386. **20.** 563. **21.** 265. **22.** 147. **23.** 324. **24.** 235. **25.** 36. **26.** 97. **27.** 88. **28.** 177. **29.** 189. **30.** 276.

Page 73. 1. 4; 8; 8; 12; 16; 18; 3; 18; 0; 0. **2.** 6; 6; 10; 10; 14; 12; 2; 2; 14; 16.

Page 76. 1. 3; 3; 0. **2.** 3; 3; 8. **3.** 3; 3; 6. **4.** 3; 3; 12. **5.** $21; $27. **6.** $36; $33.

Page 77. 1. 3; 5; 8; 10. **2.** 4; 6; 7; 9. **3.** 7. **4.** 4; 2. **5.** 27; 21; 18; 15; 24; 12.

Page 78. 2. 3. **3.** 2. **4.** 3. **5.** 2. **6.** 3. **7.** 4. **8.** 6. **9.** 4. **10.** 3.

Page 79. 1. 20; 28; 36. **2.** 32. **3.** 8; 28; 24; 32; 40. **4.** 36; 28; 32.

Page 80. 1. 28. **2.** 36. **3.** 12; 20; 32. **4.** 28.

Page 81. 1. 7; 9. **2.** 6. **3.** 6; 4; 10. **4.** 8; 4; 9.

Page 82. 1. 15. **2.** 45¢. **3.** 35. **4.** 22; 33; 47. **5.** 52; 29; 17.

Page 83. 1. 5; 20; 3. **2.** 5; 45; 8. **3.** 9; 7; 5. **4.** 7; 9; 3. **5.** 8; 10; 4. **6.** 3.

Page 84. 1. 6. **2.** 3. **3.** 6¢. **4.** $27. **5.** 8. **6.** $28.

Page 85. 1. 26; 82; 84; 46; 48; 64; 644. **2.** 63; 93; 88; 44; 28; 69; 693.

Page 87. 1. 212; 60; 308; 158; 264; 66; 666. **2.** 192; 256; 65; 171; 320; 48; 484. **3.** 102; 220; 150; 24; 272; 160; 966. **4.** 134; 294; 352; 258; 306; 84; 844. **5.** 267; 156; 168; 186; 388; 252; 924.

Page 90. 1. 51. **2.** 36. **3.** 102. **4.** 58. **5.** 42. **6.** 97.

Page 91. 1. 85¢. **2.** 50¢. **3.** 36¢. **4.** 40; 16; 4. **5.** 8¢. **6.** 4¢. **7.** 65¢. **8.** 192. **9.** 60.

Page 92. 1. 80¢. **2.** 180 ft. **3.** 360 ft. **4.** 611. **5.** 87. **6.** 80. **7.** 45¢. **8.** 36¢. **9.** 10¢.

Page 94. **1.** 12; 14; 21; 24; 33; 41; 42; 422. **2.** 11; 12; 20; 23; 13; 32; 22; 222. **3.** 11; 10; 20; 22; 21; 6; 12; 111. **4.** 21. **5.** 22. **6.** 12; 21; 30.

Page 95. **1.** 11, rem. 2 ¢. **2.** 10, rem. 3 ¢. **3.** 12, rem. 1 ¢. **4.** 22, rem. 1. **5.** 11, rem. 2. **6.** 22, rem. 2. **7.** 33, rem. 1. **8.** 11, rem. 1. **9.** 31, rem. 1. **10.** 31, rem. 1. **11.** 21, rem. 1. **12.** 31, rem. 2. **13.** 40, rem. 1. **14.** 32, rem. 1. **15.** 22, rem. 1.

Page 96. **1.** 16; 17; 26; 29; 36; 48; 22; 224. **2.** 24; 8; 29; 18; 16; 27; 21; 121. **3.** 14; 13; 16; 18; 24; 23; 9; 91. **4.** 13. **5.** 30; 28; 26; 19; 331. **6.** 22; 21; 31; 19; 333. **7.** 25. **8.** 18.

Page 97. **3.** 2. **4.** 3. **5.** 6.

Page 98. **1.** $\frac{2}{3}$. **2.** $\frac{3}{3}$, or 1. **3.** 0. **4.** $\frac{1}{2}$. **5.** 2. **6.** 3.

Page 99. **1.** $\frac{1}{5}$. **3.** 8.

Page 102. **1.** 595; 655; 661; 779; 772; 587. **2.** 881; 795; 935; 807; 875; 937. **3.** 674; 864; 921; 855; 920; 920. **4.** 642; 860; 784; 901; 760; 735. **5.** 355; 295; 345; 285; 187; 198. **6.** 259; 258; 404; 473; 592; 248. **7.** 288; 307; 628; 157; 385; 513. **8.** 376; 459; 389; 604; 295; 448. **9.** 83; 78; 299; 54; 312; 414. **10.** 50; 66; 28; 72; 90; 99. **11.** 123; 92; 160; 128; 215; 135. **12.** 110; 155; 126; 252; 120; 118. **13.** 238; 308; 264; 400; 405; 228. **14.** 92. **15.** $72. **16.** 14; 23; 26; 11; 17; 29; 20; 8. **17.** 19; 31; 35; 15; 23; 39; 27; 11. 18; 30; 34; 14; 22; 38; 26; 10. **18.** 24; 39; 44; 19; 29; 49; 34; 14. 23; 38; 43; 18; 28; 48; 33; 13. 22; 37; 42; 17; 27; 47; 32; 12. **19.** 16; 21; 26; 31; 36, rem. 1; 37, rem. 1. **20.** 17; 19; 23; 25; 26, rem. 2; 30, rem. 1. **21.** 12; 14; 18; 20, rem. 1; 21, rem. 3; 23, rem. 1. **22.** 13; 15; 14, rem. 2; 16, rem. 3; 19; 19, rem. 4.

Page 104. **1.** 85. **2.** 34. **3.** 90 ¢. **4.** 75 ¢. **5.** 30. **6.** 84 ¢. **7.** 37 ¢. **8.** Yes; 12 ¢. **9.** 70 ¢. **10.** 80 ¢. **11.** $1.00. **12.** 42 ¢. **13.** 52 ¢. **14.** 48 ¢. **15.** $17. **16.** 18. **17.** 6; 12; 30. **18.** 48; 36; 84. **19.** 463 ft. **20.** 54. **21.** 48. **22.** 8; 24.

Page 110. **1.** 101; 207. **2.** 1001; 5004. **3.** 2101. **4.** 3207. **5.** 3417. **6.** 4765. **7.** 5555. **8.** 6819. **9.** 7890. **10.** 9999. **11.** 3333.

Page 111. **1.** XV; VIII; XI; XVII; XIII; IX; V; X; XIV. **2.** 11; 9; 19; 14; 17; 7; 18.

EP

Page 113. **1.** $4.00; $1.75.   **2.** $16.00; $3.03.   **3.** $14.00; $7.25.
4. $18.00; $16.80. **5.** $230.00; $175.75. **6.** $100.00; $248.49. **7.** $184.00;
$250.49. **8.** $200.00; $500.50. **9.** $300.00; $750.85. **10.** $400.00; $286.98.
11. $768.00. **12.** $150.10. **13.** $275.10.

Page 114. **1.** 206. **2.** 248. **3.** 282. **4.** 345. **5.** 236. **6.** $238.
7. $160.

Page 115. **1.** 255. **2.** 337. **3.** 264. **4.** 257. **5.** 366. **6.** 3149.
7. 3236. **8.** 3704. **9.** 4153. **10.** 2503.

Page 116. **1.** 384. **2.** 230. **3.** 517. **4.** 311. **5.** 108. **6.** $219.
7. $53. **8.** $300.

Page 117. **1.** $560. **2.** 680. **3.** 703. **4.** 615. **5.** $730. **6.** $702.
7. 800. **8.** 766. **9.** 888. **10.** $779. **11.** 502. **12.** 650. **13.** 462.
14. 506. **15.** 666. **16.** 368. **17.** 250. **18.** 460. **19.** 550. **20.** 517.
21. $736. **22.** $512. **23.** $515. **24.** $774. **25.** $718.

Page 118. **1.** $10.47. **2.** $10.55. **3.** $8.65. **4.** $8.74. **5.** $14.70.
6. $5.39. **7.** $12.50. **8.** $15.70. **9.** $12.58. **10.** $12.35.

Page 119. **1.** $4.11. **2.** $7.75. **3.** $6.15. **4.** $14.29. **5.** $10.72.
6. $7.29. **7.** $7.27. **8.** $4.69. **9.** $6.19. **10.** $5.77. **11.** $6.91. **12.** $5.21.

Page 120. **1.** 107. **2.** 69. **3.** 146. **4.** 198. **5.** 208. **6.** 148. **7.** 172.
8. 118. **9.** 189. **10.** 99. **11.** 323. **12.** 70. **13.** 429. **14.** 203. **15.** 565.
16. 364. **17.** 505. **18.** 575. **19.** 367. **20.** 189. **21.** $148. **22.** $39.
23. $174. **24.** $41. **25.** $91. **26.** $125. **27.** $365. **28.** $108. **29.** $355.
30. $94. **31.** $114. **32.** $818. **33.** $99. **34.** $139. **35.** $85. **36.** $248.
37. $179. **38.** $48. **39.** $280. **40.** $578. **41.** $394. **42.** $379.

Page 122. **1.** $47.49. **2.** $16.87. **3.** $17.78. **4.** $4.89. **5.** $29.92.
6. $5.45. **7.** $64.89. **8.** $28.92. **9.** $221.25. **10.** $171.25. **11.** $171.19.
12. $168.19.

Page 123. **1.** $0.92. **2.** $78.49. **3.** $13.40. **4.** $8.73. **5.** $59.59.
6. $18.77. **7.** $8.89. **8.** $85.41. **9.** $24.13. **10.** $39.39. **11.** $9.69.
12. $17.64. **13.** $3.88. **14.** $34.25. **15.** $53.73. **16.** $23.22. **17.** $15.39.
18. $12.57. **19.** $18.77. **20.** $74.31.

Page 126. **1.** 186. **2.** $1.26. **3.** $180. **4.** 1206. **5.** 1806. **6.** 3006.
7. 2406. **8.** 5406. **9.** 4206. **10.** 33; 58; 40. **11.** 48; 51; 20.

Page 127. **1.** 240. **2.** 250. **3.** 468. **4.** 650. **5.** 850. **6.** 550. **7.** 960.
8. 963. **9.** 975. **10.** 1029. **11.** 1338. **12.** 1359. **13.** 824. **14.** 1080.

15. 1590. **16.** 1652. **17.** 2608. **18.** 4725. **19.** 2030. **20.** 2305. **21.** 2080. **22.** 3262. **23.** 4528. **24.** 2184.

Page 128. **1.** 8; 9; 10. **2.** 9; 6; 7. **3.** 4; 5; 11. **4.** 5. **5.** 6; 18; 5.

Page 129. **1.** 324. **2.** 213. **3.** 111. **4.** 221. **5.** 111. **6.** 111. **7.** 100. **8.** 224. **9.** 423. **10.** 231. **11.** 112. **12.** 212. **13.** 110. **14.** 110. **15.** 100. **16.** 112. **17.** 234. **18.** 312. **19.** 210. **20.** 111. **21.** 101. **22.** 434. **23.** 111. **24.** 111. **25.** 120. **26.** 102.

Page 131. **1.** 707. **2.** 714. **3.** 784. **4.** 924. **5.** 2345. **6.** 1589. **7.** 1400. **8.** 1428. **9.** 1568. **10.** 2268. **11.** 2576. **12.** 2534. **13.** 2800. **14.** 2863. **15.** 2933. **16.** 3073. **17.** 3423. **18.** 6993.

Page 132. **1.** 8. **2.** 5. **3.** 7¢. **4.** 9¢. **5.** $6.

Page 133. **1.** 52; 53; 54; 102. **2.** 21. **3.** 93. **4.** 327. **5.** 162. **6.** 127. **7.** 121. **8.** 81. **9.** 97. **10.** 62. **11.** 145. **12.** 73. **13.** 57. **14.** 101.

Page 135. **1.** 1600. **2.** 1608. **3.** 1616. **4.** 1696. **5.** 1936. **6.** 2768. **7.** 2400. **8.** 2880. **9.** 2888. **10.** 2920. **11.** 3024. **12.** 2664. **13.** 3200. **14.** 3760. **15.** 3800. **16.** 3888. **17.** 3984. **18.** 2712. **19.** 4600. **20.** 4656. **21.** 5000. **22.** 5400. **23.** 5496. **24.** 4572.

Page 136. **1.** 9; 10; 7. **2.** 8; 9. **3.** 8; 8; 16. **4.** 16; 24; 32. **5.** 8. **6.** 80. **7.** 111. **8.** 110. **9.** 60. **10.** 71. **11.** 70. **12.** 101.

Page 137. **2.** $70; $90; $60. **3.** $72. **4.** 72¢.

Page 138. **1.** 2187. **2.** 2880. **3.** 3654. **4.** 5148. **5.** 7767. **6.** 6678. **7.** 2946. **8.** 4945. **9.** 8181. **10.** 5274. **11.** 4295. **12.** 4608. **13.** 4104. **14.** 5274. **15.** 2445. **16.** 3234. **17.** 5873. **18.** 8847. **19.** 47¢.

Page 139. **1.** 6885. **2.** 7218. **3.** 6588. **4.** 6102. **5.** 4464. **6.** 6183. **7.** 2412. **8.** 2385. **9.** 2655. **10.** 2475. **11.** 5283. **12.** 6472. **13.** 3591. **14.** 3357. **15.** 3483. **16.** 1854. **17.** 2786. **18.** 7024.

Page 140. **1.** 3. **2.** 4. **3.** 6. **4.** 20. **5.** 31. **6.** 41. **7.** 51. **8.** 21. **9.** 60. **10.** 40. **11.** 50. **12.** 100. **13.** 110. **14.** 111. **15.** 101.

Page 142. **4.** 2; 3; 4; 5; 6; 7; 8; 9; 10.

Page 143. **1.** 2238. **2.** 4145. **3.** 5463. **4.** 5352. **5.** 3896. **6.** 6881. **7.** 836. **8.** 3612. **9.** 4185. **10.** 6084. **11.** 2679. **12.** 2862. **13.** 5504. **14.** 3968. **15.** 3123. **16.** 3648. **17.** 7497. **18.** 5168.

Page 145. **1.** 50¢; $1.00. **2.** 8; 80¢. **3.** 50¢. **4.** 4¢; 60¢. **5.** 6¢; 18¢; 90¢. **6.** 5 pt.

EP

Page 146. **1.** 6¢; 9¢. **2.** 100¢, or $1. **3.** 180¢, or $1.80. **4.** 260¢, or $2.60. **5.** 130¢, or $1.30. **6.** 70¢. **7.** 200¢, or $2. **8.** 120¢, or $1.20. **9.** 700¢, or $7. **10.** $2.50.

Page 148. **3.** $460; $1380.

Page 149. **1.** 6. **2.** 16; 32; 32. **3.** 2; 40.

Page 150. **1.** 1506 lb. **2.** 1527 lb. **3.** 1315 lb. **4.** 1285 lb. **5.** 717 lb. **6.** 445 lb. **7.** 572 lb. **8.** 674 lb.

Page 151. **3.** 6. **4.** 70.

Page 152. **1.** 24 sq. in.; 20 in. **2.** 6 sq. in. **3.** 40 sq. ft.; 26 ft. **4.** 36; 24. **6.** $\frac{1}{4}$; 4 sq. in.; 8 in.; 16 sq. in.; 16 in.

Page 153. **1.** $10.40. **2.** $20.20. **3.** $31.79. **4.** $108.61. **5.** $82.00. **6.** $13.89. **7.** $27.30. **8.** $82.20. **9.** $219.00. **10.** $292.00.

Page 154. **1.** 54¢; 57¢. **2.** 92¢; 96¢. **3.** 81¢; 72¢. **4.** 75¢; 69¢.

Page 155. **1.** $22.73. **2.** $15.87. **3.** $18.57. **4.** $212.86. **5.** $245.28. **6.** $29.99. **7.** $26.42. **8.** $26.36. **9.** $70.75. **10.** $166.10. **11.** $2.96. **12.** $3.76. **13.** $4.83. **14.** $1.86. **15.** $10.46. **16.** $3.89. **17.** $4.24. **18.** $4.18. **19.** $24.58. **20.** $18.79. **21.** $3.09. **22.** $6.79. **23.** $3.21. **24.** $22.89. **25.** $62.35. **26.** $2.58. **27.** $4.32. **28.** $1.73. **29.** $23.06. **30.** $62.34.

Page 156. **1.** $542. **2.** $1458. **3.** $2380. **4.** $3215. **5.** $4686. **6.** $5894. **7.** $7496. **8.** $2241. **9.** $2394. **10.** $6984. **11.** $5988. **12.** $5901. **13.** $5439. **14.** $3184. **15.** $7857. **16.** 138; 174; 111; 189; 246; 264; 306; 102; 90; 171; 363; 207; 243; 249; 168; 285; 144; 480. 92; 116; 74; 126; 164; 176; 204; 68; 60; 114; 242; 138; 162; 166; 112; 190; 96; 320. **17.** 70; 115; 140; 85; 205; 185; 245; 55; 120; 225; 125; 155. 56; 92; 112; 68; 164; 148; 196; 44; 96; 180; 100; 124. **18.** 70; 91; 140; 147; 77; 84; 35; 42; 49; 56; 63; 154. 60; 78; 120; 126; 66; 72; 30; 36; 42; 48; 54; 132. **19.** 90; 99; 45; 27; 36; 54; 63; 72; 81; 108; 117; 18. 80; 88; 40; 24; 32; 48; 56; 64; 72; 96; 104; 16.

Page 157. **1.** 70¢; 74¢. **2.** 48¢; 56¢. **3.** 96¢; 92¢. **4.** 94¢; 88¢. **5.** 30¢; 40¢. **6.** 18¢; 20¢. **7.** 72¢; 76¢. **8.** 76¢. **9.** 71¢.

Page 158. **1.** 5055; 1858; 7346; 1914. **2.** $1135. **3.** 5195. **4.** $1081.33. **5.** 7678. **6.** 156. **7.** 952 miles. **8.** $1.30. **9.** 348¢; $3.48. **10.** $1161. **11.** $405. **12.** 2640. **13.** 98¢. **14.** $2962. **15.** $385; $405. **16.** $1944. **17.** $47. **18.** $3384. **19.** $153. **20.** $3.83. **21.** 256.

Page **160.** **1.** $9.89. **2.** $17.77. **3.** $27.82. **4.** $73.79. **5.** $172.82.
6. $19.97. **7.** $34.54. **8.** $97.50. **9.** $95.65. **10.** $160.43. **11.** $29.03.
12. $36.13. **13.** $100.66. **14.** $106.02. **15.** $104.01. **16.** $26.32. **17.** $31.60.
18. $85.20. **19.** $109.71. **20.** $105.03. **21.** $2.42. **22.** $3.26. **23.** $3.33.
24. $2.04. **25.** $8.55. **26.** $6.23. **27.** $4.38. **28.** $4.03. **29.** $5.64.
30. $9.08. **31.** $5.64. **32.** $3.02. **33.** $6.78. **34.** $5.73. **35.** $8.89.
36. $2.88. **37.** $3.89. **38.** $2.99. **39.** $5.29. **40.** $26.09. **41.** $339.
42. $896. **43.** $2550. **44.** $9672. **45.** $9400. **46.** $6650. **47.** $3495.
48. $8163. **49.** $9024. **50.** $7000. **51.** $5400. **52.** $4963. **53.** $7308.
54. $9450. **55.** $8550. **56.** 234; 163; 228; 126, rem. 1; 186; 107; 165,
rem. 1; 273, rem. 1; 317; 209; 486; 452, rem. 1. **57.** 118; 148; 121,
rem. 2; 78, rem. 1; 208; 217; 161, rem. 1; 263, rem. 1; 136; 297; 266;
325, rem. 1. **58.** 231; 188; 206; 228; 238, rem. 3; 183, rem. 2; 141; 180,
rem. 3; 148; 240, rem. 1; 229, rem. 2; 128, rem. 1. **59.** 102; 133; 104;
147; 128, rem. 4; 112; 154; 177, rem. 2; 118; 124, rem. 3; 148, rem. 2; 165.
60. 111; 104; 106; 120, rem. 5; 122; 124, rem. 2; 121, rem. 1; 135; 137;
140, rem. 5; 154; 155, rem. 3. **61.** 104; 106, rem. 3; 112, rem. 1; 113,
rem. 6; 116; 115; 123; 124, rem. 5; 130; 133, rem. 4; 134, rem. 5; 135,
rem. 5. **62.** 91; 93; 82; 84; 74; 64; 49; 38; 116; 123; 13, rem. 7; 27,
rem. 6. **63.** 37; 74; 82; 73; 61; 36; 63; 45; 78; 89; 86, rem. 3; 98, rem. 6.

Page **164.** **1.** 19 ¢. **2.** 6 ¢. **3.** 32. **4.** 16 ¢.

Page **165.** **1.** 17 ¢. **2.** $12.25. **3.** $2.25. **4.** 55 ¢. **5.** 68 ¢. **6.** 85 ¢;
15 ¢. **7.** $1.30; 20 ¢. **8.** $3.50.

Page **168.** **1.** 11. **2.** 64. **3.** 26. **4.** 66. **5.** 72. **6.** 97. **7.** 77. **8.** 34.
9. XXXI. **10.** LXXXIX. **11.** XLII. **12.** XCI. **13.** LXVII. **14.** LXXV.
15. CLXXV. **16.** CL. **17.** MDCCCCXIX, or MCMXIX. **18.** MDCCCCXX,
or MCMXX.

Page **169.** **1.** $9.14. **2.** $14.25. **3.** $14.20. **4.** $28.57. **5.** $42.09.
6. $34.61. **7.** $80.76. **8.** $86.16. **9.** $78.47. **10.** $75.48. **11.** 936.
12. $920.30. **13.** 21,451.

Page **170.** **1.** 37 ft. **2.** 77 men. **3.** 453. **4.** 278. **5.** 149; 201. **6.** 143;
103. **7.** $505. **8.** $438. **9.** 21. **10.** 716.

Page **171.** **1.** $146.40. **2.** $483.73. **3.** $190.70. **4.** $317.88. **5.** $294.98.
6. $326.26. **7.** $89.32. **8.** $123.14. **9.** $523.96. **10.** $221.88.

Page **173.** **1.** 270. **2.** $2.70. **3.** 550. **4.** $25.50. **5.** $40.80. **6.** $7.50.
7. $4.05. **8.** $21.75. **9.** $74.40. **10.** $101.50. **11.** $37.20. **12.** $35.80.
EP

13. $11.65. **14.** $117.10. **15.** $148.20. **16.** $28.86. **17.** $24.54. **18.** $43.68.
19. $301. **20.** $183.75. **21.** $21.63. **22.** $25.13. **23.** $38.88. **24.** $575.44.
25. $298.68. **26.** $56.88. **27.** $19.17. **28.** $114.75. **29.** $132.75. **30.** $662.88.
31. $4.50. **32.** $22.75. **33.** $39. **34.** $58.80.

Page 175. **1.** $27.50; $127.50; $227.50; $255. **2.** $260; $483;
$532.50; $697.30. **3.** $829.60; $1000; $2000; $5000. **4.** 840; 720;
1620; 1060; 1340. **5.** 780; $24; $44; $70; $44.60. **6.** $90; $114; $98;
$155; $193. **7.** 400; 2200; 4500; 5000; 8100; 7500; 4200; 8600.
8. 7700; 3600; 8300; 8700; 6300; 6600; 2900; 9900. **9.** 1000; 1600;
1400; 1800; 1200; 3000; 3600; 5000. **10.** 7000; 8200; 9600; 11,000;
9200; 12,000; 13,400; 15,000. **11.** $60. **12.** $120. **13.** $250. **14.** $420.
15. $640. **16.** $1800. **17.** $70. **18.** $350. **19.** $682.50.

Page 176. **1.** $3; $3.60; $4.20. **2.** $3.50; $3.80; $4.30. **3.** $2.40;
$3.60. **4.** 60¢. **5.** 270; 270; 540. **6.** $3.50; 70¢. **7.** $12.50; $25; $37.50.
8. $510; $765. **9.** $1147.50; $1530; $2295. **10.** $5000; $5625; $4375.
11. $2275· $910; $1820. **12.** $3020; $2642.50; $1132.50. **13.** $1750;
$2625.

Page 177. **1.** $672; $992. **2.** $903; $1333; $1763. **3.** 966; 1113;
1365; 1596; 1743; 798; 1092; 1974; 1260. **4.** 837; 1612; 2294; 1209;
2635; 1271; 868; 1953; 2976. 1107; 2132; 3034; 1599; 3485; 1681;
1148; 2583; 3936. **5.** 1716; 2392; 2964; 2288; 1820; 3536; 2860;
4108; 4264. 2046; 2852; 3534; 2728; 2170; 4216; 3410; 4898; 5084.
2376; 3312; 4104; 3168; 2520; 4896; 3960; 5688; 5904. **6.** 2444;
3588; 1300; 3692; 4836; 1872; 4368; 3016; 4940. 2914; 4278; 1550;
4402; 5766; 2232; 5208; 3596; 5890. 3384; 4968; 1800; 5112; 6696;
2592; 6048; 4176; 6840. **7.** 5985; 5292; 7304; 9021. **8.** 7104; 8232;
9306; 5632.

Page 178. **1.** $72.30. **2.** $77.71. **3.** $106.78. **4.** $80.73. **5.** $50.37.
6. $14.76. **7.** $69.44. **8.** $98.89. **9.** $172.80. **10.** $397.60. **11.** $202.74.
12. $110.88. **13.** $54.21. **14.** $119. **15.** $66.75. **16.** $48; $576. **17.** $12;
$936; $540. **18.** $84; $175; $266; $322. **19.** $58.88. **20.** $109.48. **21.** $300.
22. $141.45. **23.** $131.15. **24.** $337.50. **25.** $148.72. **26.** $231. **27.** $198.

Page 179. **1.** $77.50. **2.** $80.30. **3.** $163.20. **4.** $220.50. **5.** $550.
6. $552.40. **7.** $101.20. **8.** $206.70. **9.** $213.12. **10.** $365.43. **11.** $880.
12. $1588.80. **13.** $435. **14.** $225.18. **15.** $420. **16.** $989.01. **17.** $3993.40.
18. $8999.10. **19.** $918.75. **20.** $20,520. **21.** $13,608. **22.** $9351.70.

EP

23. $5858.28. **24.** $29,898.81. **25.** $6868.80. **26.** $9140.60. **27.** $8447.60. **28.** $11,244.22. **29.** $19,822. **30.** $48,007.20.

Page 180. 1. 25,641. **2.** 28,413. **3.** 53,997. **4.** 127,650. **5.** $185,150. **6.** $195,800. **7.** 30,618. **8.** 83,868. **9.** 139,167. **10.** 75,828. **11.** $71,672. **12.** $322,270.

Page 181. 1. $8840; $9095; $9265. **2.** $3825; $5362.50; $4012.50; $4087.50. **3.** $50,044.80. **4.** $54,799.75. **5.** $69,501.78. **6.** $44,788.52. **7.** $119,276.50. **8.** $187,360.56. **9.** $117,308.25. **10.** $165,232.76. **11.** $286,144.20. **12.** $789,270.30.

Page 182. 1. $1.86. **2.** $1.26. **3.** $164. **4.** $1.26. **5.** $1.47. **6.** 90¢. **7.** 90¢. **8.** 36¢. **9.** $1.80. **10.** $1.20. **11.** 54¢. **12.** $1.08. **13.** $5.60. **14.** $2.05. **15.** $1.89. **16.** $1.40. **17.** 45¢. **18.** $2.10. **19.** $1.80. **20.** $1.20. **21.** $1.89. **22.** 96¢. **23.** 90¢. **24.** $168. **25.** $1.20; 5¢. **26.** 84¢; 16¢. **27.** 46¢; 4¢. **28.** $132; $8. **29.** $350; $50. **30.** $550; $50. **31.** $590; $10. **32.** $155; $5. **33.** $25; $5.

Page 183. 1. 5¢. **2.** 72¢; 3¢. **3.** $1.00. **4.** 40¢. **5.** 60¢. **6.** 36¢. **7.** $1.27.

Page 184. 1. 24¢. **2.** 22¢. **3.** 60¢. **4.** 6¢. **5.** 9¢. **6.** 12¢. **7.** 63¢.

Page 185. 1. $4.85. **2.** $4.75. **3.** 6. **4.** $189.75. **5.** 58¢. **6.** $3.75. **7.** $2.70. **8.** $38.50; $77.

Page 186. 1. 3552. **2.** 3552. **3.** 4984. **4.** 64,296. **5.** 85,869. **6.** 37,093. **7.** 72,928. **8.** 66,123. **9.** 26,461. **10.** 72,720. **11.** 75,336. **12.** 39,001. **13.** 64,218. **14.** 677,329. **15.** 96,933. **16.** 90,873. **17.** 282,492. **18.** 390,656. **19.** 360,675. **20.** 357,414. **21.** 387,816. **22.** 312,900. **23.** 434,600. **24.** $51. **25.** $190.56. **26.** $771.44. **27.** $605.64. **28.** $388.85. **29.** $592.02. **30.** $335. **31.** $367.36. **32.** $498.96. **33.** $396.48. **34.** $473.04. **35.** $327.36. **36.** $214.38. **37.** $235.17. **38.** $284.34. **39.** $711.75. **40.** $455.76. **41.** $289.56. **42.** $657.72. **43.** $383.13. **44.** $307.80. **45.** $645. **46.** $821.30. **47.** $367.36. **48.** $592.02. **49.** $1844.64. **50.** $967.98. **51.** $1444.85. **52.** $1504.80. **53.** $1257.62. **54.** $1976.32. **55.** $4635.68. **56.** $2031.74. **57.** $2621.88. **58.** $4174.08. **59.** $5236.59. **60.** $5077.26. **61.** $4016.04. **62.** $2173.94. **63.** $3432.52. **64.** $6229.66. **65.** $6646.96. **66.** $2426.88. **67.** $5308.82. **68.** $3684.20. **69.** $3410.68.

Page 187. 1. 6; 7; 9; 13; 19; 27; 39. **2.** 4; 8; 12; 13; 14; 15; 16. **3.** 17; 19; 21; 23; 24; 27; 32. **4.** 12. **5.** 14. **6.** 15. **7.** 6. **8.** 12. **9.** 16. **10.** 24. **11.** 26. **12.** 41. **13.** 20. **14.** 2. **15.** 12.

EP

Page 188. **1.** $914\frac{1}{3}$. **2.** $1043\frac{1}{4}$. **3.** $1226\frac{1}{6}$. **4.** $706\frac{1}{8}$. **5.** $1170\frac{5}{7}$.
6. $321\frac{7}{8}$. **7.** $360\frac{1}{9}$. **8.** $1374\frac{1}{2}$. **9.** $2058\frac{1}{4}$. **10.** $584\frac{1}{2}$. **11.** $1698\frac{1}{4}$.
12. $2063\frac{1}{2}$. **13.** $1390\frac{5}{6}$. **14.** $1856\frac{1}{2}$. **15.** $1170\frac{4}{9}$. **16.** $529\frac{5}{8}$. **17.** $388\frac{4}{9}$.
18. $1307\frac{1}{6}$. **19.** $1641\frac{2}{3}$. **20.** $408\frac{3}{8}$. **21.** $1620\frac{5}{8}$. **22.** $466\frac{1}{3}$. **23.** $718\frac{2}{3}$.
24. $1690\frac{2}{3}$. **25.** $621\frac{5}{6}$. **26.** $1096\frac{5}{8}$. **27.** $1306\frac{1}{4}$. **28.** $823\frac{1}{10}$. **29.** $624\frac{3}{10}$.
30. $918\frac{7}{10}$. **31.** $298\frac{3}{10}$. **32.** $376\frac{1}{10}$. **33.** $376\frac{7}{10}$.

Page 191. **1.** 11. **2.** 12. **3.** 13. **4.** 111. **5.** 112. **6.** 141. **7.** 121.
8. 131. **9.** 351. **10.** 431. **11.** 321. **12.** 212. **13.** 231. **14.** 717.
15. 155. **16.** 65; 66; 76. **17.** 22; 32; 33. **18.** 58 lb.

Page 193. **1.** 23. **2.** 45. **3.** 25. **4.** 116. **5.** 133. **6.** 16. **7.** 23.
8. 19. **9.** 37. **10.** 111. **11.** 144. **12.** 66. **13.** 99. **14.** 51. **15.** 21.
16. 24; 33. **17.** 21; 31.

Page 194. **1.** 62. **2.** 102. **3.** 120. **4.** 62. **5.** 303. **6.** 532. **7.** 51.
8. 64. **9.** 402. **10.** 111. **11.** 102. **12.** 102. **13.** 222. **14.** 109. **15.** 107.

Page 195. **1.** 121. **2.** 111. **3.** $39\frac{4}{29}$. **4.** $58\frac{7}{39}$. **5.** $59\frac{20}{69}$. **6.** $138\frac{30}{59}$.
7. $31\frac{30}{78}$. **8.** $88\frac{12}{98}$. **9.** $16\frac{1}{99}$. **10.** $139\frac{12}{37}$. **11.** $47\frac{22}{99}$. **12.** $89\frac{21}{58}$. **13.** $69\frac{21}{77}$.
14. $79\frac{25}{88}$. **15.** $66\frac{27}{96}$. **16.** 85.

Page 196. **1.** 9. **2.** 7. **3.** 7. **4.** 6. **5.** 4. **6.** 8. **7.** 9. **8.** 8. **9.** 6.
10. 7. **11.** 8. **12.** 8. **13.** 7. **14.** 9. **15.** 8. **16.** 66. **17.** 88. **18.** 82.
19. 102, rem. 1. **20.** 81. **21.** 109, rem. 3. **22.** 112. **23.** 71, rem. 8.
24. 66. **25.** 77, rem. 1. **26.** 104. **27.** 66. **28.** 81, rem. 5. **29.** 113.
30. 243. **31.** 219, rem. 3. **32.** 91. **33.** 73, rem. 4. **34.** 82. **35.** 132.
36. 123, rem. 2. **37.** 110, rem. 8. **38.** 51. **39.** 71. **40.** 87. **41.** 29.
42. 114. **43.** 112. **44.** 372. **45.** 365. **46.** 82. **47.** 93. **48.** $117\frac{38}{73}$.
49. $113\frac{30}{79}$. **50.** $138\frac{5}{53}$. **51.** $141\frac{8}{61}$. **52.** $222\frac{9}{31}$. **53.** $171\frac{21}{23}$. **54.** 85.
55. 28. **56.** $201\frac{4}{49}$. **57.** $141\frac{37}{52}$. **58.** $149\frac{38}{63}$. **59.** $88\frac{66}{74}$. **60.** $109\frac{26}{59}$.

Page 197. **1.** $45. **2.** $21. **3.** 35. **4.** $11. **5.** 21; 22. **6.** 43 mi.
7. 46. **8.** $33. **9.** 66. **10.** 23; $10. **11.** 606. **12.** 324. **13.** 328.
14. 792. **15.** 1632. **16.** 648. **17.** 925. **18.** 933. **19.** 506.

Page 198. **1.** $1.40. **2.** $0.54. **3.** $2.16. **4.** $2.88. **5.** $0.45.
6. $0.36. **7.** $0.36. **8.** $0.32. **9.** $2.70. **10.** $5.40. **11.** $0.27.
12. $0.48.

Page 199. **1.** 125. **2.** $2.50. **3.** $9. **4.** $0.16. **5.** $75. **6.** $850.
7. $3.80. **8.** 32. **9.** 6. **10.** 32. **11.** 4. **12.** 24. **13.** 30. **14.** 49.
15. 50. **16.** 54. **17.** $31\frac{40}{88}$. **18.** 121. **19.** 96. **20.** $1.40. **21.** $0.60.
22. $447\frac{41}{72}$. **23.** $612\frac{1}{67}$. **24.** 810. **25.** 964.

Page 202. 1. 8. **2.** 34. **3.** 10. **4.** 13½. **5.** 58⅓. **6.** 21. **7.** 47. **8.** 58⅔. **9.** 7⅔. **10.** 12. **11.** 92. **12.** 85½. **13.** 82⅔. **14.** 113⅔.

Page 203. 1. 8⅔ in. **2.** 15½ in. **3.** 5½. **4.** 2½. **5.** 6⅔. **6.** 4⅓. **7.** 12¾. **8.** 17¼. **9.** 3. **10.** 4. **11.** 6⅔. **12.** 4⅔. **13.** 7⅔. **14.** 11⅔. **15.** 7¾. **16.** 7. **17.** 6¾. **18.** 6¾. **19.** 12¾. **20.** 13¾.

Page 204. 1. 177; 118½. **2.** 177; 117⅔. **3.** 971½; 286. **4.** 707⅔; 109. **5.** 557; 164. **6.** 588½; 252½. **7.** 541½; 142½. **8.** 557; 297⅔. **9.** 456; 197. **10.** 849; 311⅔. **11.** 730; 471½. **12.** 778; 240⅔. **13.** 631; 175⅔. **14.** 953⅓; 407⅓. **15.** 1508; 411. **16.** 1449; 352. **17.** 975½; 424½. **18.** 896⅓; 303⅔. **19.** 927⅔; 672½. **20.** 834; 588⅔. **21.** 469; 333⅔. **22.** 349; 251⅔. **23.** 1010½; 811⅔. **24.** 828½; 773½. **25.** 1265; 376½. **26.** 1476; 437. **27.** 1053; 564½. **28.** 993; 502½. **29.** 1477; 178⅔. **30.** 999; 441⅔. **31.** 927½; 275½. **32.** 1367; 77⅔. **33.** 1035¾; 564¼. **34.** 1104; 379. **35.** 1123; 188½.

Page 206. 2. 12. **3.** 24. **4.** 36. **5.** 22. **6.** 33. **7.** 10. **8.** 20. **9.** 40. **10.** 66. **11.** 100; 125; 150.

Page 207. 1. 6; 12; 7; 14; 20. **2.** 4; 12; 8; 24; 30. **3.** 5; 10; 15; 30; 40. **4.** 2; 10; 3; 15; 10. **5.** 2; 6; 10; 10; 50.

Page 208. 1. 42; 84. **2.** 110; 220. **3.** 150; 300. **4.** 170; 340. **5.** 213; 426. **6.** 241; 482. **7.** 32; 96. **8.** 56; 168. **9.** 82; 246. **10.** 86; 258. **11.** 131; 393. **12.** 168; 504. **13.** 45; 90. **14.** 135; 180. **15.** 67; 268. **16.** 290; 519. **17.** 56; 280. **18.** 121; 605. **19.** 41; 123. **20.** 205; 287. **21.** 180; 305. **22.** 21; 242. **23.** 123; 168. **24.** 360; 400. **26.** 39. **27.** 18. **28.** 8 yd. **29.** 287 ft. **30.** $450; $270.

Page 210. 1. 1. **2.** 1. **3.** ¾. **4.** ¼. **5.** 1. **6.** 1⅙. **7.** 4⁄10. **8.** ⅝. **9.** 1⅛. **10.** 1 1⁄10. **11.** 1 1⁄12. **12.** 1 3⁄8. **13.** 1 5⁄16. **14.** 9⁄16. **15.** 1 1⁄16. **16.** ⅜. **17.** 1¼. **18.** ⅝. **19.** ⅞. **20.** 1⅛. **21.** 1⅜. **22.** ⅜. **23.** ⅝. **24.** ⅞. **25.** 1⅛. **26.** 1⅜. **27.** 1⅝. **28.** 2. **29.** 2¾. **30.** 11. **31.** 8.

Page 211. 1. 4 yd. **2.** 2 yd. **3.** 3¾. **4.** 6¾. **5.** 3. **6.** 6. **7.** 11. **8.** 4. **9.** 17½. **10.** 6. **11.** 6⅔. **12.** 9. **13.** 4¾. **14.** 14¾. **15.** 5⅝. **16.** 16⅝. **17.** 10⅝. **18.** 3⅜ ft. **19.** 3⅝. **20.** 8⅝. **21.** 13¾. **22.** 10 1⁄8. **23.** 12 4⁄15. **24.** 8 13⁄16. **25.** 3⅜. **26.** 10⅝. **27.** 14 7⁄8. **28.** 10⅛. **29.** 11⅞. **30.** 12. **31.** 5⅜. **32.** 12¾. **33.** 9⅝. **34.** 14¼. **35.** 9⅝. **36.** 8½. **37.** 2⅜ in. **38.** 10⅝ in.

Page 212. 1. 7½ yd. **2.** 7¾ yd. **3.** 4⅔. **4.** 6¼. **5.** 3½. **6.** 3¾. **7.** 1¼. **8.** 1¾. **9.** 1¾. **10.** 3¾.

EP

Page 214. 1. 300 qt. **2.** 580 qt. **3.** 24 qt. **4.** 49 qt. **5.** 700 qt. **6.** 90 qt.
7. 2 qt. **8.** 6 qt. **9.** 2 gal. **10.** 9 gal. **11.** 24 gal. **12.** 12 gal. **13.** 42 gal.
14. 21 gal. **15.** 60 gal. **16.** 30 gal. **17.** 16 ¢; 4 ¢; 32 ¢. **18.** 240; 480.
19. 60 ¢; $2.40. **20.** 8 da. **21.** 150.

Page 216. 1. 7; 1. **2.** 14; 2. **3.** 3; 14; 21. **4.** 60; 1; 2. **5.** 60; 1; 6.
6. 120; 2; 10.

Page 218. 1. 6156. **2.** 32. **3.** $10,248. **4.** $63. **5.** $1200. **6.** 54.
7. $89.60. **8.** 6960. **9.** 360. **10.** 32. **11.** 45.

Page 219. 1. 7299. **2.** 11,347. **3.** $6.61. **4.** $17.78. **5.** $43.53. **6.** 10,691.
7. 17,140. **8.** $10.85. **9.** $55.99. **10.** $95.24. **11.** 266. **12.** 2393. **13.** $4.66.
14. $4.87. **15.** $77.85. **16.** $46.75. **17.** $42.78. **18.** $605.76. **19.** $1531.60.
20. $5087.50. **21.** $395\frac{5}{37}$. **22.** $578\frac{64}{74}$. **23.** $706\frac{59}{75}$. **24.** 1925. **25.** $1768\frac{20}{48}$.
26. 51,984. **27.** 166,772. **28.** 365,211. **29.** 639,576. **30.** 43,681. **31.** 108.
32. 126. **33.** 135. **34.** 220. **35.** 66. **36.** 220. **37.** 32 pt. **38.** 64 qt. **39.** 4 wk.

Page 220. 1. $5\frac{1}{2}$ hr. **2.** $194\frac{1}{4}$ miles. **3.** $3.90. **4.** $1.05. **5.** $5\frac{1}{4}$ hr.
7. 61 ¢. **8.** 36 ¢. **9.** 63 ¢. **10.** $2.25. **11.** $3.85. **12.** $24.60.

Page 223. 1. 75,016. **2.** 200,406. **3.** 555,007. **4.** 999,900. **5.** One
hundred twenty-five thousand, fifty. **6.** Three hundred four thousand, four.
7. Five hundred thousand, five. **8.** One hundred one thousand, ten. **9.** One
hundred thousand, one hundred. **10.** One hundred twenty-three thousand,
four hundred fifty-six.

Page 224. 1. 16,002,009. **2.** 71,000,570. **3.** 62,004,006. **4.** 479,000,000.
5. 515,000,300. **6.** 6,093,017.

Page 225. 1. 149,025 square miles. **2.** 12,900 lb. **3.** $786.08. **4.** $1081.74.
5. $2379.13. **6.** $856.34.

Page 226. 1. $456.03. **2.** $357.75. **3.** $417.02. **4.** $521.82. **5.** $505.39.
6. $108.35. **7.** $510.06. **8.** $400.65. **9.** $623.59. **10.** $97.77. **11.** $515.79.
12. $804.16.

Page 227. 1. $5346. **2.** $22,995. **3.** $25,110. **4.** $14,300. **5.** $30,070.
6. $26,508. **7.** $14,763. **8.** $20,444. **9.** $27,553. **10.** $58,420. **11.** $39,732.
12. $63,168. **13.** $79,985. **14.** $47,058. **15.** $50,594. **16.** $38,766.
17. $9072. **18.** $12,064. **19.** $16,875. **20.** $12,720. **21.** $46,272.
22. $28,875. **23.** $32,940. **24.** $22,101. **25.** $33,600. **26.** $11,368.
27. $19,992. **28.** $28,490. **29.** $19,136. **30.** $38,750.

Page 228. **1.** 15,640. **2.** 106,875. **3.** 54,954. **4.** 131,588. **5.** 251,560. **6.** 51,480. **7.** 118,341. **8.** 47,656. **9.** 130,938. **10.** 120,960. **11.** 65,325. **12.** 75,296. **13.** 197,640. **14.** 498,381. **15.** 571,356. **16.** 126,766. **17.** 142,444. **18.** 88,374. **19.** 244,200. **20.** 623,796. **21.** 309,771.

Page 229. **1.** 55,937. **2.** 36,663. **3.** 190,454. **4.** 159,075. **5.** 440,450. **6.** 908,091. **7.** 234,576. **8.** 383,394. **9.** 263,934. **10.** 303,485. **11.** 777,308. **12.** 564,682. **13.** 263,250. **14.** 598,850. **15.** 1,180,912. **16.** 807,216. **17.** 999,486. **18.** 917,181. **19.** $28,125. **20.** $11,875. **21.** $1,194,875. **22.** $853,200. **23.** $267.30. **24.** $312.80; $340. **25.** $154,000; $140,000. **26.** $330,750; $253,125. **27.** $8925; $9409.50. **28.** $2875; $2903.75; $3047.50; $3105; $3133.75. **29.** $8700; $9004.50; $9048; $13,311; $13,441.50. **30.** $27,024; $27,429.36; $27,632.04; $27,226.68; $27,361.80. **31.** $14,650; $14,767.20; $14,855.10; $14,884.40; $14,913.70. **32.** $21,150; $21,467.25; $28,446.75; $28,482; $34,791.75.

Page 230. **1.** 20. **2.** $20\frac{7}{300}$. **3.** $20\frac{107}{300}$. **4.** $200\frac{107}{300}$. **5.** $230\frac{107}{300}$. **6.** 20. **7.** $20\frac{9}{200}$. **8.** $20\frac{109}{200}$. **9.** $17\frac{107}{6000}$. **10.** $21\frac{111}{7000}$.

Page 231. **1.** 4. **2.** 21. **3.** 5. **4.** 26. **5.** 23. **6.** 29. **7.** 27. **8.** 7. **9.** 4. **10.** 6. **11.** 7. **12.** 41. **13.** 6. **14.** 34. **15.** 33. **16.** 24. **17.** 22. **18.** 8.

Page 232. **1.** 120. **2.** 232. **3.** 138. **4.** 224. **5.** 669. **6.** 429. **7.** 254. **8.** 206. **9.** 532. **10.** 413. **11.** 380. **12.** 461. **13.** 342. **14.** 352. **15.** 378. **16.** 423. **17.** 277. **18.** 300. **19.** 136. **20.** 135. **21.** 235. **22.** 446. **23.** 248. **24.** 124. **25.** 312. **26.** 138. **27.** 253. **28.** 309. **29.** 338. **30.** 348. **31.** 425. **32.** 344. **33.** 425. **34.** 261. **35.** $353. **36.** $17. **37.** $35.

Page 233. **1.** 9; 108. **2.** 2640; 1320; 660. **3.** 160; 80; 40. **4.** 36; 198; 63,360. **5.** 2; 17. **6.** 264; 355.

Page 234. **1.** 224. **2.** $6\frac{2}{16}$. **3.** 68. **4.** $4\frac{1}{4}$. **5.** 112. **6.** 7. **7.** 832. **8.** 22.

Page 235. **1.** 16; 16. **2.** 240. **3.** 1664 sq. ft. **4.** 3654 sq. yd. **5.** 1936 sq. ft. **6.** 703 sq. yd. **7.** 4214 sq. ft. **8.** 17,112 sq. ft.

Page 236. **4.** 9 sq. ft.; 1 sq. yd.; 1296 sq. in.

Page 239. **1.** 102 sq. ft. **2.** 324 sq. ft. **3.** 1113 sq. in. **4.** 300 sq. yd. **5.** 1248 sq. yd. **6.** 1650 sq. yd. **7.** 1725 sq. rd. **8.** 1368 sq. ft. **9.** 1504 sq. in. **10.** 5494 sq. in. **11.** 1551 sq. yd. **12.** 5184 sq. ft. **13.** 1102 sq. in. **14.** 2666 sq. mi. **17.** 8 in.; 64. **18.** 640. **19.** 475. **20.** 98.

Page 240. **1.** 38 ft. **3.** $2\frac{1}{2}$ in.

EP

Page 242. 1. 3 cu. ft. **2.** 128 cu. in. **3.** 6. **4.** 3192 cu. in. **5.** 37,152 cu. in. **6.** 1656 cu. ft. **7.** 1396 cu. yd.

Page 243. 1. 1152. **2.** 2160. **3.** 180. **4.** 192. **5.** 2850. **6.** 2310.

Page 245. 1. $216.75. **2.** $187. **3.** $6.10. **4.** $65.25. **5.** $92.75; $185.50; $251.75; $371; $490.25; $649.25. **6.** $80.75. **7.** $128.70; $137.80; $150.80; $162.50. **8.** $12.90. **9.** $12.90.

Page 246. 1. $24.75. **2.** $0.35. **3.** $1.85. **4.** $1.39.

Page 247. 1. $57.60; $7.20; $4.80. **2.** $10.81; $86.48. **3.** $4.19. **4.** $0.81. **5.** $3.92. **6.** $658.56. **7.** 45 min. **8.** 2 hr. 25 min.

Page 250. 1. 15; 30. **2.** 12; 60. **3.** 27; 54. **4.** 9; 18. **5.** 15; 30. **6.** 21; 42. **7.** 14; 28. **8.** 18; 36. **9.** 22; 44. **10.** 13; 39; 52. **11.** 6; 18; 24. **12.** 17; 51; 68. **13.** 8; 24; 32. **14.** 16; 48; 64. **15.** 19; 57; 76.

Page 253. 1. $\frac{1}{2}$; $\frac{1}{2}$; $\frac{2}{2}$; $\frac{3}{2}$; $\frac{4}{2}$; $\frac{6}{2}$; $\frac{8}{2}$; $\frac{10}{2}$. **2.** $\frac{2}{4}$; $\frac{1}{4}$; $\frac{2}{4}$; $\frac{8}{4}$; $\frac{5}{4}$; $\frac{10}{4}$; $\frac{9}{4}$; $\frac{11}{4}$. **3.** $\frac{4}{8}$; $\frac{2}{8}$; $\frac{6}{8}$; $\frac{8}{8}$; $\frac{12}{8}$; $\frac{28}{8}$; $\frac{1}{8}$; $\frac{2}{8}$. **4.** $\frac{6}{12}$; $\frac{8}{12}$; $\frac{9}{12}$; $\frac{4}{12}$; $\frac{8}{12}$; $\frac{2}{12}$; $\frac{10}{12}$; $\frac{1}{12}$. **5.** $\frac{1}{2}$; $\frac{1}{2}$; $\frac{5}{4}$; $\frac{4}{4}$; $\frac{1}{2}$; $\frac{2}{3}$; $\frac{8}{4}$; $\frac{1}{2}$. **6.** $\frac{2}{8}$ in.; $\frac{3}{8}$ in.; $\frac{1}{2}$ in. is the greater. **7.** $\frac{4}{12}$ in.; $\frac{8}{12}$ in.; $\frac{1}{8}$ in. is the greater. **8.** $\frac{8}{8}$; $\frac{2}{6}$; $\frac{4}{8}$. **9.** $\frac{5}{10}$; $\frac{2}{10}$; $\frac{6}{10}$; $\frac{4}{10}$; $\frac{8}{10}$. **10.** $\frac{5}{15}$; $\frac{3}{15}$; $\frac{6}{15}$; $\frac{12}{15}$; $\frac{10}{15}$; $\frac{9}{15}$. **11.** $\frac{8}{16}$; $\frac{4}{16}$; $\frac{14}{16}$; $\frac{12}{16}$; $\frac{6}{16}$; $\frac{10}{16}$. **12.** $\frac{1}{2}$; $\frac{2}{4}$; $\frac{8}{16}$. **13.** $\frac{2}{2}$; $\frac{4}{4}$; $\frac{16}{16}$. **14.** 2; 2; 4. **15.** 4; 4; 8. **16.** 5; 5; 10.

Page 254. 1. $\frac{8}{4}$. **2.** $1\frac{1}{8}$. **3.** $\frac{7}{8}$. **4.** $1\frac{1}{4}$. **5.** $1\frac{2}{8}$. **6.** $1\frac{1}{8}$. **7.** $\frac{3}{8}$. **8.** $1\frac{3}{8}$.

Page 256. 1. 10 lb. **2.** 5 yd. **3.** $14\frac{2}{3}$ ft. **4.** $24\frac{1}{2}$ ft. **5.** $87\frac{1}{4}$ lb. **6.** $57\frac{5}{8}$. **7.** $34\frac{11}{18}$ ft. **8.** 222. **9.** $552\frac{2}{8}$ ft. **10.** $11\frac{15}{16}$.

Page 257. 1. $\frac{3}{4}$ in. **2.** $\frac{1}{2}$ in. **3.** $\frac{5}{8}$ in. **4.** $\frac{1}{6}$. **5.** $\frac{1}{4}$. **6.** $\frac{3}{8}$. **7.** $\frac{1}{4}$. **8.** $\frac{1}{6}$. **9.** $\frac{8}{10}$. **10.** $\frac{5}{8}$. **11.** $\frac{5}{8}$. **12.** $\frac{1}{12}$. **13.** $\frac{5}{12}$. **14.** $2\frac{5}{12}$ in. **15.** $2\frac{1}{12}$. **16.** $3\frac{5}{8}$ yd. **17.** $4\frac{1}{8}$ yd. **18.** $4\frac{1}{10}$ in.

Page 259. 1. $4. **2.** $8. **3.** $28. **4.** $18. **5.** $32. **6.** $80. **7.** $125. **8.** $84. **9.** $112. **10.** $222.

Page 261. 1. $7.17. **2.** $21.15. **3.** $13.04. **4.** $3.54. **5.** $1.63. **6.** $4.60.

Page 263. 1. $1.82. **2.** $2.93. **3.** $438.06. **4.** $197.98. **5.** $379.61. **6.** $1030.60. **7.** $464.38. **8.** $355.85. **9.** $320.20.

Page 264. 1. $452. **2.** 116. **3.** 10 ¢. **4.** $16; $640. **5.** $29,080. **6.** 55. **7.** $365. **8.** $20.60. **9.** 732. **10.** $117.50. **11.** 378. **12.** $250. **13.** 6. **14.** $420. **15.** $2987.75. **16.** 960 sq. rd. **17.** $1600. **18.** $1. **19.** $5\frac{1}{3}$. **20.** 21. **21.** $6400. **22.** 124; 31. **23.** 128. **24.** 80 ¢. **25.** 40 ¢. **26.** $5.60.

27. \$4.80. **28.** 20 yd. **29.** \$90. **30.** 160. **31.** 5 in. **32.** 36. **33.** 12; 18; 48. **34.** 52¢. **35.** \$3.75. **36.** 54¢. **37.** \$8.70. **38.** 648; 4536. **39.** 72; 144. **40.** 45¢. **41.** 1¢. **42.** 65¢. **43.** \$10. **44.** \$5.85.

Page 269. 1. \$2.55; \$1.90. **2.** \$4.45. **3.** \$3.70. **4.** 20¢. **5.** \$1.75; \$1.75. **6.** 25¢. **7.** 76. **8.** 102.

Page 270. 2. 98. **3.** \$11.20. **4.** \$11.90. **5.** \$4.45; \$17.80. **6.** \$2.95; \$8.85. **9.** \$47.84; \$5.98.

Page 273. 1. 13,423. **2.** 7860. **3.** 12,473. **4.** 13,673. **5.** 13,617. **6.** 13,860. **7.** 12,820. **8.** 13,865. **9.** 18,371. **10.** 7876. **11.** 16,224. **12.** 16,298. **13.** 17,074. **14.** 13,008. **15.** 8855. **16.** 7032. **17.** 17,078. **18.** 13,420. **19.** 13,829. **20.** 7980. **21.** \$101.19. **22.** \$573.06. **23.** 10,119. **24.** 17,462. **25.** \$174.62. **26.** \$1746.20. **27.** \$142.58. **28.** \$128.24. **29.** \$159.45. **30.** \$136.46. **31.** 1811. **32.** 1976. **33.** 2082. **34.** 2219. **35.** \$13.98. **36.** \$95.16. **37.** \$61.50. **38.** \$211.89. **39.** \$95.88. **40.** \$788.79.

Page 274. 1. 3534. **2.** 4238. **3.** 1373. **4.** 4121. **5.** 3646. **6.** 2307. **7.** 1869. **8.** 6018. **9.** 4909. **10.** 1309. **11.** 2471. **12.** 1779. **13.** 1017. **14.** 3178. **15.** 1848. **16.** 194. **17.** 2229. **18.** 2799. **19.** 589. **20.** 949. **21.** \$26.12. **22.** \$101.93. **23.** \$149.07. **24.** \$250.84. **25.** \$271.66. **26.** \$344.26. **27.** \$16.89. **28.** \$202.39. **29.** \$275.75. **30.** \$283.73. **31.** \$102.23. **32.** \$318.66. **33.** \$185.71. **34.** \$35.29. **35.** \$272.34. **36.** \$124.09. **37.** \$87.50. **38.** \$152.25. **39.** \$517.40. **40.** \$185.85.

Page 275. 1. 1102. **2.** 2940. **3.** 6048. **4.** 3780. **5.** 928. **6.** 8428. **7.** 6510. **8.** 7200. **9.** 5848. **10.** 3872. **11.** 3304. **12.** 13,287. **13.** 49,989. **14.** 34,868. **15.** 58,176. **16.** 73,704. **17.** 43,522. **18.** 30,625. **19.** 24,508. **20.** 56,196. **21.** 41,382. **22.** 344,634. **23.** 393,092. **24.** 210,384. **25.** 454,658. **26.** 824,588. **27.** 486,180. **28.** 149,343. **29.** 436,954. **30.** 207,792. **31.** 90,428. **32.** 356,728. **33.** 178,017. **34.** 296,160. **35.** 552,234. **36.** 358,080. **37.** 345,040. **38.** 141,570. **39.** 304,992. **40.** 259,956. **41.** \$97.44. **42.** \$290.40. **43.** \$203.75. **44.** \$254.94. **45.** \$323.68. **46.** \$709.38. **47.** \$408.48. **48.** \$691.18. **49.** \$507.87. **50.** \$647.68. **51.** \$41.70. **52.** \$96.88. **53.** \$229.04. **54.** \$412.02. **55.** \$673.75. **56.** \$1025.28. **57.** \$3406.96. **58.** \$5045.04. **59.** \$7009.08. **60.** \$8331.84.

Page 276. 1. $16\frac{12}{26}$. **2.** $15\frac{18}{24}$. **3.** $18\frac{22}{28}$. **4.** $20\frac{15}{48}$. **5.** $24\frac{32}{37}$. **6.** $16\frac{17}{49}$. **7.** $20\frac{16}{33}$. **8.** 26. **9.** $30\frac{2}{32}$. **10.** $18\frac{2}{27}$. **11.** $33\frac{29}{88}$. **12.** $72\frac{40}{66}$. **13.** $196\frac{26}{29}$.
EP

14. $221\frac{32}{37}$.   **15.** $211\frac{25}{43}$.   **16.** $213\frac{9}{46}$.   **17.** $67\frac{30}{75}$.   **18.** $86\frac{28}{93}$.   **19.** $106\frac{61}{85}$.

20. $93\frac{74}{96}$.   **21.** $51\frac{81}{42}$.   **22.** $66\frac{78}{85}$.   **23.** $87\frac{89}{92}$.   **24.** $117\frac{53}{77}$.   **25.** $88\frac{16}{92}$.

26. $86\frac{28}{46}$.   **27.** $72\frac{45}{70}$.   **28.** $53\frac{48}{69}$.   **29.** $44\frac{48}{90}$.   **30.** $138\frac{54}{56}$.   **31.** $66\frac{22}{32}$.

32. $98\frac{46}{49}$.   **33.** $77\frac{49}{80}$.   **34.** $54\frac{86}{91}$.   **35.** $43\frac{9}{86}$.   **36.** $148\frac{29}{32}$.   **37.** $165\frac{16}{29}$.

38. $89\frac{49}{92}$.   **39.** $67\frac{19}{88}$.   **40.** $40\frac{40}{99}$.   **41.** \$12.   **42.** \$12.   **43.** \$4.32.

44. \$144.   **45.** \$72.   **46.** \$121.   **47.** \$637.   **48.** \$202.   **49.** \$212.

50. \$183.   **51.** \$105$\frac{10}{12}$.   **52.** \$232$\frac{2}{14}$.   **53.** \$58$\frac{18}{21}$.   **54.** \$67$\frac{27}{33}$.   **55.** \$113$\frac{10}{42}$.

56. \$89$\frac{15}{45}$.   **57.** \$69$\frac{37}{72}$.   **58.** \$171$\frac{16}{36}$.   **59.** \$167$\frac{13}{29}$.   **60.** \$210$\frac{12}{18}$.

Page 277. **1.** $\frac{4}{8}$.   **2.** $\frac{6}{8}$.   **3.** $\frac{2}{4}$.   **4.** $\frac{2}{16}$.   **5.** $\frac{6}{16}$.   **6.** $\frac{2}{8}$.   **7.** $\frac{4}{8}$.   **8.** $\frac{3}{9}$.
9. $\frac{10}{18}$.   **10.** $\frac{28}{32}$.   **11.** $\frac{7}{8}$.   **12.** $\frac{7}{8}$.   **13.** $1\frac{5}{8}$.   **14.** $1\frac{1}{8}$.   **15.** $1\frac{3}{8}$.   **16.** $\frac{5}{6}$.
17. $1\frac{1}{6}$.   **18.** $1\frac{5}{12}$.   **19.** $1\frac{18}{24}$.   **20.** $\frac{11}{16}$.   **21.** $\frac{1}{4}$.   **22.** $\frac{1}{4}$.   **23.** $\frac{3}{8}$.   **24.** $\frac{1}{8}$.
25. $\frac{1}{8}$.   **26.** $\frac{1}{8}$.   **27.** $\frac{1}{10}$.   **28.** $\frac{4}{15}$.   **29.** $\frac{1}{6}$.   **30.** $\frac{1}{12}$.   **31.** $\frac{7}{8}$.   **32.** $1\frac{3}{8}$.
33. $1\frac{7}{8}$.   **34.** $2\frac{1}{8}$.   **35.** $\frac{17}{24}$.   **36.** $1\frac{7}{24}$.   **37.** $2\frac{7}{24}$.   **38.** $1\frac{1}{30}$.   **39.** $1\frac{7}{30}$.
40. $1\frac{29}{30}$.   **41.** 214.   **42.** 276.   **43.** 416.   **44.** 156.   **45.** 552.   **46.** 121.
47. 96.   **48.** 310.   **49.** 511.   **50.** 285.   **51.** $6\frac{1}{4}$.   **52.** $1\frac{1}{4}$.   **53.** $7\frac{7}{8}$.   **54.** $\frac{7}{8}$.
55. $9\frac{1}{6}$.   **56.** $4\frac{1}{6}$.   **57.** $5\frac{17}{24}$.   **58.** $3\frac{1}{24}$.   **59.** $9\frac{18}{15}$.   **60.** $5\frac{7}{15}$.

Page 278. **1.** 12 in.   **2.** 84 in.   **3.** 108 in.   **4.** 3 ft.   **5.** 21 ft.   **6.** $10\frac{1}{2}$ ft.
7. 36 in.   **8.** 90 in.   **9.** $16\frac{1}{2}$ ft.   **10.** 33 ft.   **11.** $5\frac{1}{2}$ yd.   **12.** $49\frac{1}{2}$ yd.   **13.** 320 rd.
14. 1280 rd.   **15.** 1760 yd.   **16.** 880 yd.   **17.** 5280 ft.   **18.** 17,160 ft.
19. 3520 ft.   **20.** 3960 ft.   **21.** 16 oz.   **22.** 12 oz.   **23.** 40 oz.   **24.** 1 lb.
25. 9 lb.   **26.** 18 lb.   **27.** 2000 lb.   **28.** 7000 lb.   **29.** 2 pt.   **30.** 15 pt.
31. 4 qt.   **32.** 15 qt.   **33.** 38 pt.   **34.** 4 pk.   **35.** 30 pk.   **36.** 8 qt.   **37.** 44 qt.
38. 1008 sq. in.   **39.** 63 sq. ft.   **40.** 420 min.

8 1 6
3 5 7
4 9 2